FINAL REPORT

VOLUME 1 OF 2

PHASE I RCRA FACILITY INVESTIGATION REPORT

ASHLAND DISTRIBUTION COMPANY CLEARFIELD, UTAH

Prepared for
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January 24, 2003

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Ashland Inc. (Ashland) is submitting this Phase I report for the Resource Conservation and Recovery Act (RCRA) facility investigation (Phase I RFI) at Ashland Distribution Company facility (Facility) located in Clearfield, Utah. The report has been prepared in accordance with the corrective action portion of Ashland's RCRA permit – Module IV (Section IV.E: parts IV.E.1 and IV.E.2) and the Phase I RCRA Facility Investigation Workplan and Addendum (hereafter referred to as the Workplan) (URS, 2000 and 2002) approved by Utah Department of Environmental Quality (UDEQ) on July 31, 2002.

The purpose of the Phase I RFI was to evaluate whether releases of hazardous waste(s) or hazardous waste constituents have occurred from the SWMUS identified for the Facility by UDEQ.

In order to meet this objective, the investigation detailed in the RFI Workplan (submitted June 29, 2000, amended July 10, 2002, and approved by UDEQ on July 31, 2002) was implemented on September 26 through 28, 2002. A summary of the tasks performed during the investigation includes the following:

- The completion of 16 soil borings at the Facility to determine the physical characteristics of the unconsolidated soil and to evaluate the nature of potential hazardous constituents in those areas; and,
- The collection and chemical analysis of groundwater samples from soil borings at the Facility to assess the nature of potential hazardous constituents in the groundwater.

Site Geology

The Facility is located within an industrial park called the Freeport Center. The site geology consists of over 30 feet of unconsolidated materials. Some degree of filling has occurred across the industrial park and the Facility property. The fill material was imported to the Freeport Center at an undetermined time and ranges from 2.0 to 3.5 feet of gravelly sand and sandy gravel mixtures or concrete. Underlying the fill material are several native soil types, including clay, silt, sand, and gravel. The clay (silty clay) soil appears to be continuous across the entire Facility. The silt (clayey silt) soil type appears to extend across the majority of the site; where it is absent, it is replaced by the silty clay soil. The top of the clayey silt is typically found between two and five feet below ground surface (bgs) and is typically between two and five feet thick. The top of the silty clay is found between two and ten feet bgs and is typically between five and 17 feet thick. Only monitoring wells MW-1 and MW-2 penetrated the silty clay. Monitoring MW-1 encountered a fine-grained silty sand and MW-2 encountered a fine-grained sand with a trace of silt. The water table across much of the Facility is relatively flat, and occurs within silt or silty sand deposits beneath the fill. The depth to groundwater is typically between three and six feet bgs. The elevation of the water table is typically between 4,403 and 4,404 feet above mean sea level (msl) and has been demonstrated to flow in a west-southwesterly direction.

Soil Investigation Results

The soil sampling results were compared to the United States Environmental Protection Agency (USEPA) generic, risk-based soil screening levels (SSLs) for commercial and industrial workers per the RFI Workplan. Tetrachloroethene (PCE) was the only volatile organic compound (VOC) detected at concentrations above the generic SSLs. PCE was detected below direct contact

exposure SSLs in all soil samples, but above the generic Migration to Groundwater SSL in the following four sample locations: the Product Storage Tank Farm/Waste Storage Areas (SWMU #2/8 – Boring AC-BH002), the Product Loading/Unloading Area (SWMU #3 – Boring AC-BH005), the Railcar Top Unloading Stations (SWMU #5 – AC-BH013), and the Hazardous Waste Storage Area (SWMU #10 – AC-BH016). PCE concentrations ranged from 100 to 300 ug/kg in these locations compared to the soil to groundwater migration SSL of 60 ug/kg.

Benzo(a)pyrene and dibenz(a,h)anthracene were the only semivolatile organic compounds (SVOCs) detected in soil samples above generic SSLs. The two compounds were detected above the generic soil ingestion-dermal SSLs in one soil sample from the Container Filling Area (SWMU #4 – Boring AC-BH007) at 930 ug/kg benzo(a)pyrene and 370 ug/kg dibenz(a,h)anthracene. The generic ingestion-dermal SSLs are 200 ug/kg for both substances.

Arsenic was detected below the generic soil to groundwater migration SSL in all soil samples. Arsenic was above the generic ingestion-dermal SSL of 2 mg/kg in 12 of the 13 soil borings analyzed for metals. The arsenic concentrations detected at the Facility ranged from 1.8 mg/kg to 8.4 mg/kg, with an average concentration of 5.2 mg/kg. An applicable background dataset, the National Uranium Resource Evaluation (NURE) was consulted in consideration of the ubiquitous and often variable findings of naturally occurring arsenic in soils. Fifteen of the nineteen NURE data points closest to the Facility contain arsenic levels ranging from 1 to 9 mg/kg,, with an average of 3.1 mg/kg. The arsenic concentrations detected at the Facility are consistent with and representative of background soil conditions.

Chromium was detected below the generic SSLs in all but one soil sample, at the Hazardous Waste Storage Area (SWMU #10 – Boring AC-BH016). The sample result of 39 mg/kg (an estimate below the reporting limit) chromium is only slightly above the generic migration to groundwater SSL of 38 mg/kg. Chromium was detected in every soil sample where metals were analyzed, at concentrations between 5.7 mg/kg and 39 mg/kg, with an average concentration of 16.1 mg/kg. All nineteen of the NURE data points closest to the Facility contain chromium, ranging from 20 ppm to 40 ppm, with an average of 25.5 ppm. The chromium concentrations detected at the Facility are consistent with and representative of background soil conditions.

Groundwater Results

Groundwater results were compared to USEPA maximum contaminant levels (MCLs) per the RFI Workplan. Only one VOC, PCE, was detected above an MCL. PCE was detected above the MCL of 5.0 microgram per liter (ug/L) in one groundwater sample at a concentration of 6.1 ug/L at the Waste Collection Tank Area (SWMU #7 – Boring AC-BH014).

No SVOCs were detected above the MCLs.

Arsenic was detected above the MCL in three of the four groundwater sampling locations. Dissolved arsenic results from filtered samples were slightly lower than total arsenic results. Data to provide background levels of arsenic in the area have not been obtained. However, based on the operational history at the Facility, arsenic is not a constituent of concern.

Summary

In summary, the RFI objective, "To assess the SWMUs for potential releases of hazardous waste or hazardous waste constituents to the soil or groundwater" has been met. Limited detections of a few compounds that are only marginally above conservative generic site screening levels were

encountered. The depth of the detections, the discontinuous geologic and hydrogeologic conditions, and the concrete cap over the majority of the 'active' areas further serve to limit potential exposure pathways. No evidence of offsite impacts was encountered. In short the investigation did not reveal results that pose an unacceptable risk to human health or the environment.

Recommendations

Based on the results of the Phase I RFI, Ashland will perform the following tasks in pursuit of a "no further action" determination by the UDEQ:

- Complete offsite disposal of decontamination and purge water.
- Complete onsite disposal of soil cuttings on the earthen berm.
- Complete a no further action (NFA) petition for the open SWMUs per Ashland's RCRA permit – Module IV (Section IV.H: part IV.H.1).

1.0 Introduction

Ashland Inc. (Ashland) is submitting this Phase I report for the Resource Conservation and Recovery Act (RCRA) facility investigation (Phase I RFI) at Ashland Distribution Company facility (Facility) located in Clearfield, Utah. The report has been prepared in accordance with the corrective action portion of Ashland's RCRA permit – Module IV (Section IV.E: parts IV.E.1 and IV.E.2) and the Phase I RCRA Facility Investigation Workplan and Addendum (hereafter referred to as Workplan) (URS, 2000 and 2002) approved by UDEQ on July 31, 2002.

1.1. PURPOSE

As stated in the Workplan, the purpose of this Phase I RFI is to provide a document describing the initial data gathering activities to evaluate whether releases of hazardous waste(s) or hazardous waste constituents have occurred from the Solid Waste Management Units (SWMUs) identified for the Facility by UDEQ.

1.2 OBJECTIVES

The objective of the Phase I RFI was to evaluate whether releases of hazardous waste(s) or hazardous waste constituents have occurred from the SWMUS identified for the Facility by UDEQ.

1.3 SCOPE OF WORK

The scope of work for this Phase I RFI report includes the following:

- The surveying of coordinates and elevations for the four existing Facility wells (MW-1, MW-2, and the two Pollulert system wells;
- The measurement of water levels in the four existing Facility wells;
- The completion of 16 soil borings at the Facility to determine the physical characteristics of the unconsolidated soil and to evaluate the nature of potential hazardous constituents in those areas; and,
- The collection and chemical analysis of groundwater samples from soil borings at the Facility to assess the nature of potential hazardous constituents in the groundwater.

2.0 Description of Current Conditions

Information concerning the Facility history, land use, regional and local geology and hydrogeology, and nature and extent of known contamination is presented in the following documents previously filed with the UDEQ: a Description of Current Conditions at Ashland Chemical's Clearfield, Utah Facility (Woodward-Clyde, 1997), the RCRA Facility Assessment (RFA) Report (UDEQ, 1999), and the Phase I RFI Workplan and Addendum (URS, 2000 and 2002). Pertinent information from these reports and several published sources is summarized below.

2.1 GENERAL FACILITY INFORMATION

Project: Ashland Chemical Company
P.O. Box 160367
Freeport Center, Building 12
Clearfield, Utah 84016
RCRA facility investigation (RFI)

Facility Owner: Ashland Inc.
c/o Cathy Pickrel
5200 Blazer Parkway
Dublin, Ohio 43017

Facility Contact: Kevin Homer
Plant Manager
(800) 293-1295 Ext. 227

Consultant: URS Diamond
700 3rd Street South
Minneapolis, MN 55415
Dean Stockwell, Project Manager
(612) 373 6881

Facility Location: The Facility is located on 6.5 acres within an industrial park (Freeport Center) in the south half of Section 2, Township 4 North, Range 2 West (Salt Lake Base and Meridian) in the extreme northern part of Freeport Center. The Facility is located within the city of Clearfield, in Davis County, Utah (Figure 1). The geographical location of the Facility is 41° 6.294' North latitude and 112° 2.150' West longitude.

2.1.1 Facility History

The Facility and the Freeport Center Industrial Park were undeveloped until the early 1940s, when the Navy developed the property for use as a supply depot. The Navy operated the Freeport Center until about 1963. During the approximately 20 years of Naval ownership and use, there were a variety of operations employing potentially hazardous materials. According to a study prepared for the Freeport Center (Dames & Moore 1989), the Naval operations included 75 underground storage tanks for fuel oil and gasoline, gas stations, above-ground fuel tanks, transformer stations, and flammable materials storage.

The Navy Supply Depot was purchased by the Freeport Center Associates in 1963 and developed into a manufacturing, distributing, and warehousing industrial park. The Freeport Center includes more than 7 million feet of warehousing space on more than 650 acres. Dozens of businesses have established facilities at the Freeport Center, although from 1963 to 1982 (when Ashland took occupancy) only one tenant previously occupied the property now used by Ashland.

According to Mr. Stephen Barrett, General Manager of the Freeport Center, the Facility known as Building 12 and currently occupied by Ashland was used by the Navy as a railroad engine roundhouse (Woodward-Clyde 1997). Railroad tracks still present on the south side of the Facility formerly extended into a large bay in Building 12, inside of which the Navy performed maintenance on the engines. There is no historical documentation available describing this work. It is unclear how waste from these operations was disposed.

A&K Railroad Salvage (A&K) occupied the Building 12 property from 1963 until 1982. According to Mr. Barrett, A&K refurbished railroad materials at the site during these years. Specific information concerning the processes employed by A&K are not available, but there were fuel tanks on the property and railroad ties have been reported to have been stored in the western portions of the property.

Ashland leased the property beginning in 1982 and has remained as sole tenant of the Building 12 area since that time.

2.1.2 Current Facility Operations

The Facility is currently a chemical distribution operation where bulk chemicals brought to the Facility are repackaged for distribution to industrial and commercial users in the Utah area. Bulk solvents are received at the Facility by tank truck and railcar for storage in the product tank farm (Figure 2). Solvents are drummed, blended, and resold in bulk or less-than-truckload quantity. No chemical manufacturing is done at this Facility.

Mixed solvent residual products are recovered from transfer hoses, pumps, and blend tanks when switching between products. The recovered solvents are placed in 55-gallon drums and segregated into product classes (nonhalogenated light products, nonhalogenated heavy products, and halogenated products). Recovered solvents are either sold for beneficial use or shipped off site to a solvent reclaimer or a waste disposal firm.

Hazardous waste is also stored on the Facility in accordance with the Facility's RCRA permit. The waste comes in the form of spent solvent returned from Ashland customers for temporary storage until it is shipped off site for disposal. Historically, spent solvent was stored in drums in the hazardous waste storage area (SWMU #10) or in a bulk storage tank in the waste storage area (SWMU #8). Hazardous waste management has been transferred to the recently permitted new hazardous waste storage area.

2.1.3 Regulatory History

The Facility operates within the conditions of a RCRA permit, originally issued by the U.S. Environmental Protection Agency (USEPA) in 1984. The UDEQ assumed primacy for this regulatory program in 1990 and now is responsible for RCRA oversight of the Facility.

The RCRA permit was reissued by UDEQ in August 1997 to provide a wider range of chemicals that could potentially be stored by the Facility. A requirement of the revised 1997 permit mandated Ashland to undertake corrective actions for releases of hazardous constituents from SWMUs. As part of these corrective actions, a Description of Current Conditions (DCC) report was prepared for the Facility in November 1997 (Woodward-Clyde 1997). This document provided a summary of the Facility history, waste management practices, data gathered during previous investigations, physical setting, and description of the SWMUs. Also, as a part of the corrective actions, UDEQ's Division of Solid and Hazardous Waste completed a RCRA Facility Assessment (RFA) for the Facility in December 1999 (UDEQ 1999). The purpose of the RFA was to identify and evaluate SWMUs at the Facility and to identify releases as appropriate. A Phase I RFI Workplan (Workplan) for this purpose was submitted by URS Corporation (URS) on June 29, 2000 and an Addendum to the Workplan was submitted to UDEQ on July 10, 2002. The Workplan was approved by UDEQ on July 31, 2002.

This Phase I RFI Report for the Facility represents the next step of the corrective action process outlined in the 1997 RCRA permit.

2.1.4 Products Managed

From the 1940's to 1963, the Navy operated at the property as a supply depot. The Naval operations included 75 underground storage tanks for fuel oil and gasoline, gas stations, above-ground fuel tanks, transformer stations, and flammable materials storage. Currently, no information about actual products managed has been available, except for the above-noted general type of products that were handled at the depot.

A&K occupied the Building 12 property from 1963 until 1982. Specific information concerning the processes employed by A&K is not available, but there were fuel tanks on the property and railroad ties have been reported to have been stored in the western portions of the Facility.

Ashland leased the property beginning in 1982 and has remained the sole tenant of the Building 12 area since that time. Ashland uses the Facility as a distribution and repackaging Facility for industrial chemicals and solvents.

2.1.5 Solid Waste Management Units

As detailed in the RFA, a total of 11 SWMUs have been identified at the Facility (Figure 3). A detailed description of each SWMU is presented in the Workplan.

2.2 LAND USE INFORMATION

Demographics of this part of Utah's Front Range of the Wasatch Mountains are changing. There is significant population growth on the east shore of the Great Salt Lake, including in the Clearfield area. Industries are moving into the area and residential housing construction is displacing agriculture on land once dedicated to crops. The Freeport Center was, before development in the early 1940s, a farming and ranching area. While the lands east of the Freeport Center have been developed for some time, rural zones west of the Freeport Center and Clearfield are increasingly being developed. The Facility itself is bordered on all sides by industries of the Freeport Center. The closest residence is estimated to be ¾ mile from the Facility.

2.2.1 Topography

Figure 1 illustrates the topography at the Facility and the surrounding area. The Facility and surrounding industrial park lie on relatively flat terrain. Elevations on site range from about 4,408 feet above mean sea level (msl) to approximately 4,400 feet msl. The topographic trend for the Facility reflects a regional pattern. The Facility rests in the Great Salt Lake Valley basin, on alluvial and colluvial sediments eroded from the Wasatch Mountains to the east. Elevations are therefore higher toward the mountains to the east, gradually decreasing toward the Salt Lake Valley to the west. The Facility slope is similar with highest elevations on the east side and lowest elevations on the west.

2.2.2 Regional Geology and Hydrogeology

Unconsolidated, fine grained, lacustrine sand, silt, and clay material, which originally eroded from the Wasatch Mountains, comprise the soil beneath the Freeport Center area. However, it is believed that the surficial material at the Facility consists primarily of fill material, which was imported to the Freeport Center area at an undetermined time. Two borings drilled at the Facility (Dames and Moore 1982) show that approximately two to four feet of fill material is present (Figure 4). These borings were later completed as wells MW-1 and MW-2 (Figure 5). Based on the boring logs, the fill material typically consists of light brown, fine sandy silt, silty fine and coarse gravel with some fine and coarse sand. Underlying the fill are silts with some clay and fine sand, or clayey silt to about 5 to 6.5 feet below ground surface (bgs). MW-2, in the northeast portion of the Facility, encountered silty clays from about 5 feet to approximately 20 feet bgs, with some thin layers of intervening fine sand. Below this layer were fine sands with small amounts of silt that extended to boring completion at about 28.5 feet bgs. MW-1, on the southwest portion of the Facility, encountered silty, very fine sands grading with thin layers of silt and clay to about 14 feet bgs. From 14 feet to about 19 feet bgs, silty clays were encountered with interbedding layers of fine sand. From about 19 feet to 31 feet bgs, silty fine sands with thin silty clay seams were logged.

Two principal hydrogeologic units are present below the Facility. A shallow unconfined aquifer is reported to range from approximately 10 feet to about 25 feet bgs in this area (USGS 1972). A deeper, confined aquifer exists below the unconfined aquifer, and can be very prolific, having typical yields of 500 to 1,000 gallons per minute (gpm), sometimes achieving yields as high as 4,000 gpm. The deeper aquifer exists under artesian conditions, with potentiometric pressures sufficient to produce flowing wells. The deeper aquifer is found at depths greater than 400 feet bgs.

The unconfined shallow aquifer is predominantly comprised of silty fine sands and fine sandy silts, with significant heterogeneity of interbedded layers of clay, silt, and sand (Dames and Moore 1989), and is consistent with materials encountered in the two site borings. Water levels measured in wells MW-1 and MW-2 have ranged from about 5 feet bgs to about 12 feet bgs. The unconfined groundwater flow is reported to have a gradient of about 0.01 feet/feet (Dames and Moore 1989, USGS 1972). Shallow groundwater flow direction for the unconfined aquifer below the Facility is east-northeast to west-southwest, following the topography.

2.3 DOCUMENTATION OF RELEASES

The Freeport Center has served as an industrial zone since the 1940s. Consistent with standard waste disposal practices of that period, there is no documentation as to whether spills or releases have occurred. Undocumented spills or releases of potentially hazardous substances may have occurred prior to Ashland's occupancy of the Facility. In fact, there is evidence that degradation of groundwater had taken place prior to startup of Ashland's operations at the Facility. A report by Dames & Moore (1982) documented elevated concentrations of phenols, total organic carbon, and halogenated compounds in a groundwater sample collected from a well on the extreme upgradient side of the Facility. However, it is unknown what caused this groundwater contamination. This section therefore concentrates on spills or releases emanating from a known source or location.

According to the Dames & Moore study from 1982, a release of product occurred during removal of an underground storage tank (UST) that was located 200 feet east and upgradient of a monitoring well MW-2 at the northeast corner of the Facility. The UST was reportedly punctured during removal operations and a large volume of the contents spilled back into the excavation. The excavation was backfilled and graded over. The type of product spilled was not disclosed, nor were volume estimates provided of product lost to the subsurface.

During an inspection in early 1984, an EPA inspector noticed an odor coming from the sampling pipe which at that time extended underground beneath the solvent recovery sump (EPA Inspection Report, 1984). Samples from the sampling pipe contained solvents. The solvent recovery sump was subsequently removed and replaced. Details of the sump replacement are provided in Section 2.4.

In May, 2001, soil samples were collected and analyzed during excavation activities for a new hazardous waste storage area. Analytical results indicated the presence of ethylbenzene, trimethylbenzene, and xylenes, all at concentrations less than 1 mg/kg. The sampling results are further discussed in the description of soil sample results in Section 4.6.1.

2.4 SUMMARY OF REMEDIAL ACTIONS TAKEN

The Solvent Recovery Sump (SWMU #1) was removed on July 17, 1984, along with the bedding material between the sump and the liner. Approximately one foot of soil from beneath the liner and pea gravel was also removed. UDEQ division of Solid and Hazardous Waste records indicated the presence of trace levels of hydrocarbon constituents at the conclusion of cleanup efforts. In Ashland's correspondence to UDEQ (Ashland Distribution Company letter dated January 30, 1985) post-remediation soil concentrations of xylenes, methanol, and acetone were reported to be not detected.

2.5 RECEPTOR INFORMATION

There are no significant surface water drainages in the vicinity of the Facility. The largest stream in the area is the Weber River, located about four miles to the north and east of the Freeport Center. Surface water that falls as precipitation at the Facility infiltrates to the subsurface, or is captured in stormwater collection systems for discharge. The discharge is permitted and monitored by UDEQ (Permit UTR 000222). There are no designated wetlands

near the Facility (USFWS, 1997). The primary wetland and waterfowl habitat in the area is adjacent to the east shore of the Great Salt Lake. Some intermittently saturated marshlands are approximately three miles west of the Facility. The Howard Slough State Waterfowl Management Area is more than four miles west of the Facility.

A number of threatened, endangered, and sensitive (TES) species are known to occur or nest along the Front Range of the Wasatch Mountains, including the bald eagle (*Haliaeetus leucocephalus*), but there are no known special status or sensitive species within one mile of the Facility (Woodward-Clyde, 1997). One Utah sensitive species is known to occur in this area. The western snowy plover (*Charadrius alexandrinus*) nests on the beach shorelines of the Great Salt Lake. The nearest known nesting site for a western snowy plover is about eight miles west of the Facility.

The Ashland Facility is part of a large manufacturing and industrial storage complex (Freeport Center) and is expected to remain as an industrial use area in the future. Access to the Facility is restricted by a chain-link fence. Therefore, potential human receptor populations now and in the future include Ashland on-site workers, contract construction workers, or authorized visitors. Access to the Facility is restricted; therefore, exposure is limited to personnel working at the Facility and individuals permitted to enter the area. Most of the Facility has been covered with concrete mitigating the potential for exposure to environmental media.. There are no residential areas in the immediate vicinity. The closest residence is estimated to be ¾ mile from the Facility.

Human exposure to groundwater emanating from the Facility is unlikely since there are no shallow, domestic-use groundwater wells in the vicinity. A water rights search of the vicinity showed only seven groundwater wells within one mile downgradient (west to southwest) from the Facility. The seven downgradient wells have the key features and uses shown on Table 1. Figure 6 shows the location of these wells with respect to the Facility. Only wells numbered 2 and 3 withdraw water from the shallow unconfined aquifer for irrigation purposes. The remainder of the wells (with the exception of well number 2 and 3) are screened at depths greater than 400 feet deep in the deep confined aquifer.

3.0 Variances to Workplan

The site investigation was performed in general accordance with the Workplan (URS, 2000 and 2002). This section describes the necessary changes that were made to the Workplan and the rationale for making the changes. Only modifications to planned activities are described here; refer to the Workplan for detailed descriptions of the planned work. These modifications and changes were discussed with UDEQ staff (Mr. Rocky Stonestreet) during the RFI implementation.

3.1 FIELDWORK SCHEDULE

Environmental drilling began on September 26, 2002, after submittal of an Addendum to the Workplan on July 10, 2002 and approval of the Workplan and Addendum by UDEQ on July 31, 2002.

3.2 PRE-SAMPLING GROUNDWATER LEVEL SURVEY

The pre-sampling groundwater level survey was not completed, as boring locations were required to be installed based on accessibility. Unknown construction details of the monitoring wells and Pollulert wells would have made dependence upon the water level elevations suspect. All boring locations were reviewed and approved by UDEQ staff, Mr. Rocky Stonestreet, prior to installation.

3.3 BORING LOCATION ADJUSTMENTS

Boring locations were adjusted due to the presence of underground utilities, physical features on the surface, and/or overhead utilities or aboveground piping runs. No boring locations were adjusted greater than 15 feet from the original proposed location. All boring locations were reviewed and approved by UDEQ staff, Mr. Rocky Stonestreet, prior to installation.

3.4 CHEMICAL SOIL SAMPLES

A duplicate sample was to be collected from soil boring AC-BH001; however, this sample contained insufficient sample volume. A duplicate was collected from soil boring AC-BH007 to replace the duplicate. A sample to be analyzed for MS/MSD purposes was to be collected from soil boring AC-BH015; however, the sample contained insufficient sample volume. As soil boring AC-BH015 was the only location analyzed for pH, chloride, and phosphate, it was not replaced. All other soil samples collected for laboratory analysis were collected as per the Workplan.

3.5 CHEMICAL GROUNDWATER SAMPLES

A groundwater sample was to be collected from soil boring AC-BH010; however, the groundwater sample could not be collected due to the low hydraulic conductivity. A groundwater sample was collected from soil boring AC-BH007 to replace the groundwater sample needed from boring AC-BH010. Groundwater samples were to be collected from soil

borings AC-BH011 and AC-BH012; however, the groundwater samples could not be collected due to low hydraulic conductivity. A groundwater sample was collected from soil boring AC-BH013 to replace the groundwater sample needed from borings AC-BH011 and AC-BH012. A groundwater sample was to be collected from soil boring AC-BH016; however, the groundwater could not be collected due to low hydraulic conductivity. No additional borings were available or representative, to replace the groundwater sample from boring AC-BH016.

4.0 Subsurface Facility Investigation

4.1 SCOPE OF INVESTIGATION

The RFI objective was to evaluate whether releases of hazardous waste(s) or hazardous waste constituents have occurred from the SWMUS identified for the Facility by UDEQ.

A detailed discussion of field methods and sampling network design, and the rationale for drilling soil borings, and collecting soil and groundwater samples can be found in the Workplan.

4.1.1 Project Target Parameters

Per the Workplan, the soil and water samples were analyzed for VOCs, SVOCs, metals, and/or cyanide. The analytical methods and method detection limits for the specified parameters are presented in Tables 2 through 4.

4.1.2 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions made during investigative activities. Since DQOs are based on the end uses of the data collected, different data uses may require different levels of data quality. Data quality indicators were calculated during the independent data validation and appropriate data validation codes were assigned to laboratory results as appropriate. Data precision, accuracy, completeness, representativeness, and comparability were assessed according to provisions of the SAP and appropriate SOPs.

4.2 PHYSICAL GEOLOGY

The discussion of the physical geology at the site is based on previous work (Dames & Moore, 1982) and the 16 newly installed soil borings (Figure 7). Boring logs are included in Appendix A. Physical soil and analytical soil and groundwater laboratory data are included in Appendix B, and a summary of the physical soil data is presented in Table 5. A Quality Assurance Review was completed as specified in the Workplan. This review precedes the analytical laboratory report in Appendix B.

A variety of unconsolidated soil types underlie the Facility. Two geologic cross sections have been prepared to depict the Facility geology. The locations of the cross sections are shown on Figure 8. Some degree of filling has occurred across the industrial park and the Facility property. The fill material was imported to the Freeport Center at an undetermined time and ranges from 2.0 to 3.5 feet of gravelly sand and sandy gravel mixtures or concrete. Underlying the fill material are several native soil types, including clay, silt, sand, and gravel. The clay (silty clay) soil appears to be continuous across the entire Facility (Figures 9 and 10). The silt (clayey silt) soil type appears to extend across the majority of the site; where it is absent, it is replaced by the silty clay soil. The top of the clayey silt is typically found between two and five feet bgs and is typically between two and five feet thick. The top of the silty clay is found between two and

ten feet bgs and is typically between five and 17 feet thick. Only monitoring wells MW-1 and MW-2 penetrated the silty clay. Monitoring MW-1 encountered a fine-grained silty sand and MW-2 encountered a fine-grained sand with a trace of silt.

4.3 PHYSICAL HYDROGEOLOGY

The water table across much of the site is relatively flat, and occurs within silt or silty sand deposits beneath the fill. The depth to groundwater is typically between three and six feet bgs. The elevation of the water table is typically between 4,403 and 4,404 feet above msl.

The soil borings were not installed for a sufficient period of time to allow the water level in the soil borings to reach equilibrium; therefore a site-specific groundwater flow direction and gradient have not been calculated. Groundwater is inferred to flow to the southwest to west-southwest, toward the Great Salt Lake. The unconfined shallow aquifer present beneath the Facility is reported to have a gradient of 0.01 feet/feet (Dames and Moore 1989, USGS 1972).

4.4 SOIL/GROUNDWATER SCREENING LEVELS

The Phase I RFI Workplan outlined the preparation of site-specific soil screening levels (SSLs) in a manner consistent with Utah Regulation R315-101-5, Health Evaluation Criteria, Risk Assessment. To complete the screening-level risk assessment, the actual land use conditions exposure scenario was identified for use, as described in R315-101-5.2 (b)(2). Subsurface soil pathways identified as potentially complete in the conceptual site model (CSM) for construction workers included, ingestion, inhalation of dust and volatiles, and dermal contact. Since completion of the Workplan in June 2000, the EPA has prepared generic SSLs for commercial and industrial settings for outdoor workers (USEPA, 2001). The CSM has been compared to the SSL scenario and the assumptions used for the calculation of the generic SSLs. The CSM is sufficiently similar to the SSL scenario to apply the generic SSLs to the Facility data as an initial screening evaluation. Therefore, soils analytical results were compared to generic SSLs that were developed by USEPA in a manner consistent with Utah Regulation R315-101-5 (for pathways including: ingestion-dermal, inhalation-volatiles, inhalation of fugitive particulates and, as a conservative measure, migration to groundwater-using a dilution attenuation factor of 20 fold).

Site-specific background sampling results were not collected for the facility for soil or groundwater. An applicable regional background data set for soils was identified in that of the National Uranium Resource Evaluation (NURE) (USGS, 2001). Data from the 19 NURE data points closest to the Facility were compiled for establishment of background concentrations and comparison (Appendix C) to the Facility soil sampling results.

Groundwater analytical results were compared to United States Environmental Protection Agency (USEPA) maximum concentration limits (MCLs) and Utah Groundwater Standards listed under R317-6-2. Since the MCLs are equal to or less than, or the Utah standards have not been formulated for all compounds with a MCL, only the MCLs are listed in this report.

4.5 SUMMARY OF ANALYTICAL RESULTS

The soil and groundwater results are grouped into three distinct groups: VOCs, SVOCs, and inorganics. Where appropriate, these three groupings are used throughout the Phase I RFI.

Figures 11 through 13 spatially depict the soil concentrations of detected compounds and Figures 14 through 16 spatially depict the groundwater concentrations of detected compounds.

4.5.1 Soil

The soil investigation was conducted to evaluate the SWMUs for the presence of constituents of interest. The soil boring locations are shown on Figure 7. A MiniRAE Plus photoionization detector (PID) with a 10.6 eV lamp was used to field screen selected headspace samples to aid in selection of samples for analysis. In general, the laboratory analytical samples were collected from the highest headspace reading. Exceptions were made to be consistent with Workplan objective of collecting the laboratory analytical samples between three feet bgs and the water table (estimated between five and eight feet bgs). Field screening results were also used in conjunction with the laboratory data as an aid to determine the extent of the boring of potential interest. The recorded headspace values are presented in Table 6 and included on the individual boring logs (Appendix A).

A total of 21 soil samples (including one duplicate sample) were collected from 16 sample locations. Analytical results are provided in Appendix B; a summary of results is provided in Tables 7 through 9. Analytical results are grouped with their respective SWMU and summarized below.

SWMU #1 Solvent Recovery Sump

Soil boring AC-BH001 was completed at the northeast corner of the solvent recovery sump to a depth of 10 feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 4.5 to 6.0 feet bgs. No individual VOCs exceeded generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 3.3 milligrams per kilogram (mg/kg), which exceeded the arsenic ingestion-dermal SSL of 2.0 mg/kg. No other detected metals or cyanide exceeded the SSLs.

SWMU #2 & 8 Product Storage Tank Farm/Waste Storage Tank Areas

As discussed in Section 2.3 and in the July 10, 2002 RFI Workplan Addendum, two soil samples were collected from the SWMU #2 tank farm area during the excavation of soils for construction of the adjacent new hazardous waste storage area in May 2001. The sampling results were reported to UDEQ at that time. The samples were collected from soils where a viscous film was observed on an area of saturated soils. An area of perched water and saturated soils was encountered in the excavation. Field sample SW-1 was obtained from the sidewall and SP-2 was collected from the soil stockpile excavated from the area where wet soils were encountered. The samples were analyzed using EPA SW-846 Method 8260B for VOCs. The following compounds were found above detection limits in SW-1:

Ethylbenzene	32.0 ug/kg
1,2,3-Trimethylbenzene	3.3 ug/kg
1,2,4-Trimethylbenzene	3.7 ug/kg
o-Xylene	46.0 ug/kg
m&p Xylenes	140.0 ug/kg

Total Petroleum Hydrocarbon (TPH, C5-C10 GRO) was also found at 0.23 ug/kg in SW-1. In SP-2, no compounds were found above detection limits. None of the detected compounds exceeded the available generic SSLs.

During the 2002 RFI sampling, soil boring AC-BH002 was completed at the southeast corner of the product storage tank farm and waste storage tank areas, near a secondary containment sump drain line, to a depth of six feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 4.0 to 5.0 feet bgs. Tetrachloroethene (PCE) was detected at a concentration of 100 ug/kg, which exceeded the Migration to Groundwater generic SSL of 60 ug/kg for PCE. No other VOCs exceeded generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 6.8 mg/kg, which slightly exceeded the ingestion-dermal SSL of 2 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). All other detected metals or cyanide were below generic SSLs.

Soil boring AC-BH003 was completed at the southwest corner of the product storage tank farm, near a secondary containment drain line, to a depth of seven feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 2.0 to 4.0 feet bgs and 6.0 feet bgs. No individual VOCs exceeded the generic SSLs. SVOCs and metals were only analyzed in the 2.0 to 4.0 feet bgs sample. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 2.2 mg/kg, which slightly exceeded the ingestion-dermal SSL of 2.0 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). All other detected metals or cyanide were below generic SSLs.

SWMU #3 Product Loading/Unloading Area

Soil boring AC-BH004 was completed near the center of the product loading/unloading area by the northernmost floor drain beneath the truck rack canopy, to a depth of 12 feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 2.5 to 4.5 feet bgs. No detected VOCs exceeded the generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 5.8 mg/kg, which exceeded the ingestion-dermal SSL of 2.0 ug/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). All other detected metals or cyanide were below generic SSLs.

Soil boring AC-BH005 was completed near the easternmost floor drain beneath the truck rack canopy, to a depth of 12 feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 5.0 to 6.0 feet bgs. PCE was detected at a concentration of 300 ug/kg, which exceeded the migration to groundwater generic SSL of 60, (but was below the ingestion-dermal and inhalation SSLs). All other VOC compounds were below generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 6.5 mg/kg, which exceeded the ingestion-dermal SSL of 2.0 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). All other detected metals or cyanide were below generic SSLs.

Soil boring AC-BH006 was completed near the southernmost floor drain beneath the truck rack canopy, to a depth of 12 feet bgs. Samples were collected for laboratory analysis from 2.5 to 3.5 feet bgs. No individual VOCs exceeded the generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 6.8 ug/kg, which exceeded the ingestion-dermal SSL of 2.0 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). No other detected metals or cyanide exceeded the generic SSLs.

SWMU #4 Container Filling Area (Drumming Room)

Soil boring AC-BH007 was completed to the southwest of the westernmost floor drain of the drumming room, to a depth of six feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 3.5 to 4.5 feet bgs. A duplicate sample was also submitted. No individual VOCs exceeded the generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at concentrations of 3.2 and 2.8 mg/kg, which slightly exceeded the ingestion-dermal SSL of 2.0 mg/kg (but were below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). No other detected metals or cyanide exceeded the generic SSLs.

Soil boring AC-BH008 was completed adjacent to the center floor drain of the drumming room, to a depth of six feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 3.5 to 4.5 feet bgs. No individual VOCs exceeded the generic SSLs. Benzo(a)pyrene, detected at a concentration of 930 ug/kg, exceeded the ingestion-dermal SSL of 200 ug/kg (but was below the migration to groundwater SSL). Dibenz(a,h)anthracene was detected at a concentration of 370 ug/kg, which exceeded the ingestion-dermal SSL of 200 (but was below the migration to groundwater SSL). No other SVOCs exceeded the generic SSL. No detected metals exceeded the generic SSLs.

Soil boring AC-BH009 was completed adjacent to the easternmost floor drain of the drumming room, to a depth of eight feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 3.0 to 4.0 feet bgs. No individual VOCs exceeded the generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 4.8 mg/kg, which exceeded the ingestion-dermal SSLs of 2.0 (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). No other detected metals or cyanide exceeded the generic SSLs.

Soil boring AC-BH010 was completed to the south of the drumming room, to a depth of 12 feet bgs. Samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 4.0 to 6.0 feet bgs. No individual VOCs exceeded the generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 8.4 mg/kg, which exceeded the ingestion-dermal SSL of 2.0 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). Thallium was detected at a concentration of 0.80 mg/kg, which slightly exceeded the migration to groundwater generic SSL

of 0.7 mg/kg (but was below the generic ingestion-dermal SSL). No other detected metals or cyanide exceeded the generic SSLs.

SWMU #5 Railcar Unloading Area

Soil boring AC-BH011 was completed adjacent to a former sump associated with the railcar unloading area, to a depth of 12 feet bgs. Soil samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 6.0 to 7.0 feet bgs. No individual VOCs exceeded the generic SSLs. All SVOCs were below method detection limits. Arsenic was detected at a concentration of 7.8 mg/kg, which exceeded the ingestion-dermal SSL of 2.0 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). Thallium was detected at a concentration of 0.88 mg/kg, which exceeded the migration to groundwater generic SSL of 0.7 mg/kg (but was below the generic ingestion-dermal SSL). There were no available thallium results in the NURE database with which to compare Facility analytical results to background concentrations. However, based on the operational history of the Facility, thallium is not a constituent of concern. All other detected metals or cyanide were below generic SSLs.

Soil boring AC-BH012 was completed adjacent to a former sump associated with the railcar unloading area, to a depth of 12 feet bgs. Soil samples were collected for VOC laboratory analysis from 6.0 to 7.5 feet and 9.0 feet bgs. No individual VOCs exceeded the generic SSLs. SVOCs and metals were not required to be analyzed.

Soil boring AC-BH013 was completed adjacent to a former sump associated with the railcar unloading area, to a depth of 12 feet bgs. Soil samples were collected for VOC laboratory analysis from 3.5 to 4.0 feet and 12 feet bgs. PCE was detected at a concentration of 290 ug/kg in the 12 feet bgs sample, which exceeded the migration to groundwater generic SSL of 60 ug/kg (but was below the ingestion-dermal and inhalation SSLs). SVOCs and metals were not required to be analyzed.

SWMU #7 Waste Collection Tank Area

Soil boring AC-BH014 was completed to the northwest of the former waste collection tank, to a depth of 6.0 feet bgs. Soil samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 4.0 to 5.0 feet bgs. No individual VOCs exceeded the generic SSLs. Phenol was the only SVOC detected. It was detected at a concentration of 170 ug/kg, well below the generic SSLs. Arsenic was detected at a concentration of 7.8 mg/kg, which exceeded the ingestion-dermal SSL of 2.0 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). All other detected metals or cyanide were below generic SSLs.

SWMU #9 Neutralization Unit Area

Soil boring AC-BH015 was completed to the southwest of the neutralization pit, to a depth of 12.0 feet bgs. Soil samples were collected for pH, chloride, and phosphate laboratory analysis from 5.0 to 6.0 feet bgs. Chloride and phosphate concentrations were below method detection limits and the pH was reported at 7.8 and 8.1.

SWMU #10 Hazardous Waste Storage Area

Soil boring AC-BH016 was completed adjacent to the central floor drain of the hazardous waste storage area, to a depth of 12.0 feet bgs. Soil samples were collected for VOC, SVOC, metals, and cyanide laboratory analysis from 3.5 and 8.0 feet bgs. PCE was detected at a concentration of 200 ug/kg in the 3.5 feet bgs sample, which exceeded the migration to groundwater generic SSL of 60 ug/L (but was below the generic ingestion-dermal and inhalation SSLs). No individual SVOCs exceeded the generic SSLs. Arsenic was detected at a concentration of 5.8 mg/kg, which exceeded the ingestion-dermal SSL of 2.0 mg/kg (but was below the migration to groundwater SSL). Comparably, the arsenic results are consistent with the range of detected arsenic levels found in the NURE background data set (i.e., 1-9 mg/kg arsenic). Chromium was detected at a concentration of 39 mg/kg, which slightly exceeded the migration to groundwater generic SSL of 38 mg/kg (but was below the ingestion-dermal SSL). Comparably, the chromium results are consistent with the range of detected chromium levels found in the NURE background data set (i.e., 20 to 40 mg/kg). SVOCs and metals were not analyzed in the 8.0 feet bgs sample.

4.5.2 Groundwater

The groundwater investigation at the site was performed conducted to evaluate the SWMUs for the presence of constituents of interest. Groundwater chemistry results are discussed relative to the SWMUs. A summary of the chemical results for groundwater and a comparison to the MCLs are presented in Tables 10 through 12.

SWMU #1 Solvent Recovery Sump

Groundwater was collected from soil boring AC-BH001 and analyzed for VOCs, SVOCs, total metals, and dissolved metals. No individual VOCs were detected above the USEPA established MCLs. All SVOCs concentrations were below method detection limits. Total arsenic was detected at a concentration of 94 micrograms per liter (ug/L) and dissolved arsenic was detected at a concentration of 77 ug/L, both above the MCL of 10 ug/L. A duplicate sample analyzed revealed consistent results. No other metals were above MCLs.

SWMU #2/8 Product Storage Tank Farm/Waste Storage Tank Areas

Groundwater was collected from soil boring AC-BH003 and analyzed for VOCs, SVOCs, total metals and dissolved metals. No individual VOCs were detected above the MCLs. All SVOCs concentrations were below method detection limits. Total arsenic was detected at a concentration of 14 ug/L and dissolved arsenic was detected at a concentration of 12 ug/L, both slightly above the 10 ug/L MCL. Dissolved antimony was detected at a concentration of 6.3 ug/L, slightly above the 6.0 ug/L MCL. Total antimony was detected at a concentration of 4.1 ug/L. Review of the laboratory data for the groundwater sample collected from AC-BH003 indicated that dissolved antimony and the total and dissolved arsenic were detected between the instrument detection limit and the reporting limit, and as such should be considered estimated values.

SWMU #3 Product Loading/Unloading Area

No groundwater was collected.

SWMU #4 Container Filling Area (Drumming Room)

Groundwater was collected from soil boring AC-BH007 and analyzed for VOCs, SVOCs, total metals, and dissolved metals. No individual VOCs were detected above the MCLs. All SVOC concentrations were below method detection limits. No total or dissolved metals were detected above the MCLs.

SWMU #5 Railcar Unloading Area

No groundwater was collected.

SWMU #7 Waste Collection Tank Area

Groundwater was collected from soil boring AC-BH014 and analyzed for VOCs, SVOCs, total metals, and dissolved metals. The SVOCS, total metals, and dissolved metals were analyzed in triplicate. PCE was detected at a concentration of 6.1 ug/L, slightly exceeding the 5.0 ug/L MCL. Benzoic acid was detected at concentrations of 3,600, 2,700, and 3,400 ug/L. Phenol was detected at concentrations of 450, 320, and 410 ug/L. MCLs have not been established for benzoic acid and phenol. Total arsenic was detected at concentrations of 24, 23, and 21 ug/L and dissolved arsenic was detected at concentrations of 19, 20, and 18 ug/L, exceeding the 10 ug/L MCL.

SWMU #9 Neutralization Unit Area

Groundwater was collected from soil boring AC-BH015 and analyzed for pH, chloride, and phosphate. The pH was reported to be neutral at 7.7. Chloride was detected at a concentration of 35 milligrams per liter (mg/L). The USEPA has not established an MCL for chloride. However, a Secondary MCL (SMCL) has been developed. SMCLs are established as drinking water guidelines that protect for aesthetic considerations, such as the taste, color and odor of water. Chemicals for which SMCLs have been set are not considered to present a risk to human health at the SMCL. The SMCL for chloride is 250 mg/L (to protect against a salty taste in water). The concentration of chloride in the water at SWMU #9 is well below the SMCL for aesthetic protection and would therefore be protective for human health purposes. Phosphate concentration was below the method detection limit.

SWMU #10 Hazardous Waste Storage Area

No groundwater was collected.

4.5.3 Investigative Derived Waste

Decontamination and purge water were stored in a 55-gallon drum and sampled after all site activities were complete. Samples were collected and submitted for laboratory analytical analysis of VOCs, SVOCs, and total metals. Low levels of 10 individual VOC compounds and two SVOCs were detected, all well below the established MCLs. Most metals analyzed were detected, but arsenic was the only metal to exceed the 10 ug/L MCL. These data will be utilized to determine an appropriate method for disposal of the investigation derived water.

All soil not utilized for laboratory analytical samples were stored in a 55-gallon drum. As per the Workplan, a composite sample was not collected. However, based on laboratory analytical data from the individual soil samples, it is expected that the drummed soil would not exceed the generic SSLs. These data will be utilized to determine an appropriate method for disposal of the investigative derived soils.

5.0 Summary and Conclusions

The Phase I investigation results were evaluated to assess the soil and groundwater concentrations detected at the Facility. The soils analytical results were compared to generic SSLs developed by USEPA in a manner consistent with Utah Regulation R315-101-5 (for pathways including: ingestion-dermal, inhalation-volatiles, inhalation of fugitive particulates and migration to groundwater-assuming a dilution attenuation factor of 20 fold). The groundwater analytical results were compared to USEPA MCLs and Utah Groundwater Standards listed under R317-6-2. Since the MCLs are equal to or less than, or the Utah standards have not been formulated for all compounds with a MCL, only the MCLs are listed in this report. The laboratory analytical results for metals in soils were compared to available National Uranium Resource Evaluation (NURE) data (USGS, 2001). Data from the 19 closest NURE data points were compiled for establishment of background concentrations and comparison (Appendix C) to the Facility data. The following summarizes and presents conclusions of the Phase I investigation results.

- The Facility physical geology consists of a 2.0 to 3.5 feet thick layer of gravelly sand and sandy gravel mixtures or concrete. Underlying the fill material are several native soil types including clay, silt, sand, and gravel. The clay soil appears to be continuous across the entire Facility. The clayey silt appears to extend across the majority of the site; where it is absent it is replaced by the silty clay soil. The alluvial deposits do not appear to be laterally continuous.
- Groundwater is inferred to flow to the southwest to west-southwest, toward the Great Salt Lake. The unconfined shallow bearing zone, if present beneath the Facility, is reported to have a gradient of 0.01 feet/feet (Dames and Moore 1989, USGS 1972). The water table across much of the site is relatively flat, and occurs within silt or silty sand deposits beneath the fill. The depth to groundwater is typically between three and six feet bgs. The results indicate groundwater associated with silt or silty sand deposits. The discontinuous nature of these deposits and the sporadic groundwater encountered is typical of perched conditions.
- There are no significant surface water drainages in the vicinity of the Facility. The largest stream in the area is the Weber River, located about four miles to the north and east of the Freeport Center. Surface water that falls as precipitation infiltrates to the subsurface, or is captured in stormwater collection systems for discharge in accordance with a UDEQ permit.
- The Quality Assurance Review indicated that the data are acceptable for project use.
- PCE was the only VOC detected in soils above the generic SSLs. PCE was detected at concentrations ranging from 100 to 300 ug/kg that were above the 60 ug/kg migration to groundwater generic SSL in four soil borings: AC-BH002, AC-BH005, AC-BH013, and AC-BH016 (Figure 11). PCE did not exceed the ingestion-dermal or inhalation SSLs in any soil samples. The PCE detected at four to five feet bgs in AC-BH002 was near the secondary containment sump drain line in the product storage tank farm/waste storage tank areas (SWMU #2/8). The PCE detected at five to six feet bgs in AC-BH005 was at the area beneath the easternmost floor drain beneath the truck rack canopy in product loading/unloading area (SWMU #3). The PCE detected at 12 feet bgs in AC-BH015 was

beneath the easternmost former sump associated with the railcar unloading area, SWMU #5. The PCE detected at 3.5 feet bgs in AC-BH016 was at the central floor drain within the hazardous waste storage area (SWMU #10).

- Benzo(a)pyrene and chrysene were the only SVOC compounds detected in soil above the generic SSLs. The two compounds were detected above the generic soil ingestion-dermal SSLs in one soil sample from the Container Filling Area (SWMU #4 – Boring AC-BH007) at 930 ug/kg benzo(a)pyrene and 370 ug/kg dibenz(a,h)anthracene. The generic ingestion-dermal SSLs are 200 ug/kg for both substances. The detections were at 3.5 to 4.5 feet bgs in AC-BH008 within the container filling area (SWMU #4) near the central floor drain (Figure 12).

- Arsenic was detected in soil above the generic ingestion-dermal SSL in 12 of the 13 soil borings analyzed for metals (Figure 13). The arsenic concentrations detected at the Facility ranged from 1.8 to 8.4 mg/kg, with an average concentration of 5.2 mg/kg. Fifteen of the 19 NURE data points closest to the Facility contain arsenic data, ranging from 1.0-9.0 mg/kg, with an average of 3.1 mg/kg. The laboratory analytical results suggest that arsenic detected at the Facility is consistent with and representative of naturally occurring background conditions.

- Chromium was detected at a concentration of 39 mg/kg (an estimate below the reporting limit) at soil boring AC-BH016 in SWMU #10, which was slightly above the generic migration to groundwater generic SSL of 38 mg/kg. Chromium was below the generic SSLs in all other samples. Chromium was detected in every soil sample where metals were analyzed, at concentrations between 5.7 mg/kg and 39 mg/kg, with an average concentration of 16.1 mg/kg. All nineteen of the NURE data points closest to the Facility contain chromium detections, ranging from 20 to 40 mg/kg, with an average of 25.5 mg/kg. Comparison of the Facility and NURE data indicates that chromium detected at the Facility is consistent with and representative of naturally occurring background conditions.

- Thallium was detected slightly above the migration to groundwater generic SSL of 0.7 mg/kg in soil borings AC-BH010 (thallium = 0.8 mg/kg) and AC-BH011 (thallium =0.88 mg/kg). However, the results were estimated results (B) below the reportable level. The results were also qualified as a result of method blank contamination (J) and do not appear to be a consequence of Facility conditions. No chloride or phosphate was detected in the soil sample from AC-BH015. Additionally, the soil pH results were neutral to slightly basic, as expected for the soil types present and confirmed as acceptable background levels through NURE data. Activities in the neutralization unit area have not resulted in increased phosphate, chloride, or pH changes at SWMU #9.

- No VOCs were detected in groundwater above MCLs with the exception of one sample, which exceeded the MCL for PCE. PCE was detected in the groundwater sample collected from AC-BH014 at a concentration of 6.1 ug/L, which was slightly above the 5.0 ug/L MCL. The PCE was detected at the former waste collection storage area (SWMU #7). The former waste collection storage area was removed in 1997.

- No SVOCs were detected above MCLs. Benzoic acid and phenol were detected in SWMU #7 in the groundwater sample collected from AC-BH014, but MCLs have not been promulgated for these compounds.

- Arsenic was detected above the 10 ug/L EPA MCL in three of the four groundwater sample locations where metals were analyzed ranging in concentrations of 14 to 94 ug/L total arsenic and 12 to 77 ug/L dissolved arsenic. Based on the naturally occurring arsenic levels in soils in the area, the arsenic detections are also expected to be the result of background conditions.
- Phosphate was not detected in the water sample from soil boring AC-BH015. Chloride was detected at a concentration of 35 ug/L, which is well below the SMCL of 250 mg/L for chloride. The groundwater pH is also neutral to slightly basic, and is consistent with areas of the site where neutralization activities did not occur. Therefore, it appears no impacts to groundwater are present from activities associated with the neutralization unit area (SWMU #9).
- There is little to no potential for off-site environmental degradation from the Facility and there is no evidence that releases or spills from the Facility have migrated off-site. Facility activities are constrained by the fenced enclosure. Additionally, exposure relative to the chemicals detected at the Facility are mitigated by their subsurface location and the concrete capping over the majority of the Facility where activities occur. The hydrogeological conditions which exist at the Facility serve to further limit migration and exposure pathways.
- There are no designated wetlands near the Facility (USFWS, 1997). The primary wetland and waterfowl habitat in the area is adjacent to the east shore of the Great Salt Lake. Some intermittently saturated marshlands are approximately three miles west of the Facility. The Howard Slough State Waterfowl Management Area is more than four miles west of the Facility.
- There are no known special status or sensitive species within one mile of the Facility although a number of threatened, endangered, and sensitive (TES) species are known to occur or nest along the Front Range of the Wasatch Mountains, including the bald eagle (*Haliaeetus leucocephalus*), (Woodward-Clyde, 1997). The nearest known nesting site for the only Utah sensitive species known to occur in the area (the western snowy plover) is about eight miles west of the Facility.
- There is little potential for human exposure to analytes detected in soil. Most of the property has been covered with concrete or buildings, so the potential for exposure to Facility employees or visitors is mitigated. Also, there are no residential areas in the immediate vicinity. The closest residence is estimated to be ¾ mile from the Facility.
- Human exposure to analytes detected in groundwater at the Facility is unlikely since there are no shallow, domestic-use groundwater wells in close proximity to the Facility. Only two wells withdraw water from the shallow unconfined aquifer and they are over ½ mile downgradient of the Facility. The discontinuous nature of the alluvial deposits further reduces likelihood of Facility activities impacting the wells that utilize the shallow unconfined aquifer. The remainder of the wells in the Facility vicinity (with the exception of the two irrigation wells) withdraw water from depths greater than 400 feet deep.

In summary, the RFI objective, "To assess the SWMUs for potential releases of hazardous waste or hazardous waste constituents to the soil or groundwater" has been met. The limited detections of analytes in the Facility soil and groundwater were only marginally above the conservative and

generic SSLs. The depth of the detections, the discontinuous geologic and hydrogeologic conditions, and the concrete cap over the majority of the Facility limit potential exposure pathways. No evidence of offsite impacts was encountered. In short the investigation did not reveal any results that pose an unacceptable risk to human health or the environment.

6.0 Recommendations

Based on the results of the Phase I RFI, and following completion of the following recommendations no further action is recommended and Ashland requests closure of this investigation:

- Complete offsite disposal of decontamination and purge water.
- Complete onsite disposal of soil cuttings on the earthen berm.
- Complete a no further action (NFA) petition for the open SWMUs per Ashland's RCRA permit – Module IV (Section IV.H: part IV.H.1).

7.0 References

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TABLES

Table 1
Downgradient Well Summary
Ashland Inc. / Clearfield DSO

Map Number	Owner	Use	Depth (feet bgs)
1	LDS Church	Domestic Stockwatering	115
2	Christine Medler	Irrigation	30
3	Michael Moyes	Irrigation	20
4	City of Syracuse	Municipal Supply	777
5	City of Syracuse	Municipal Supply	943
6	City of Syracuse	Municipal Supply	400
7	City of Syracuse	Municipal Supply	628

Notes:
bgs = Below ground surface

Table 2
Volatile Organic Compound Parameter List, Quantification Limits, and Methods
Ashland Inc. / Clearfield DSO

Analyte	Soil (µg/kg)			Water (µg/l)		
	MDL	Proposed RL	Actual RL Range	MDL	Proposed RL	Actual RL Range
Acetone	2.97	20	21 - 1200	1.88	10	10 - 10
Acrolein	23.43	100	110 - 6100	4.71	20	20 - 20
Acrylonitrile	18.99	100	110 - 6100	2.39	20	20 - 20
Benzene	1.28	5	5.4 - 300	0.21	1	1 - 1
Bromodichloromethane	1.58	5	5.4 - 300	0.22	1	1 - 1
Bromoform	1.57	5	5.4 - 300	0.32	1	1 - 1
Bromomethane	2.09	10	11 - 610	0.3	2	2 - 2
2-Butanone (MEK)	2.97	20	21 - 1200	0.93	5	5 - 5
tert-Butyl alcohol	14.58	200	210 - 12000	6.29	50	50 - 50
Carbon disulfide	1.99	5	5.4 - 300	0.19	1	1 - 1
Carbon tetrachloride	1.08	5	5.4 - 300	0.19	1	1 - 1
Chlorobenzene	0.96	5	5.4 - 300	0.3	1	1 - 1
Dibromochloromethane	1.37	5	5.4 - 300	0.38	1	1 - 1
Chloroethane	1.3	10	11 - 610	0.25	2	2 - 2
2-Chloroethyl vinyl ether	--	--	54 - 3000	0.13	2	2 - 2
Chloroform	1.43	5	11 - 610	0.23	1	1 - 1
Chloromethane	1.17	10	11 - 610	0.3	2	2 - 2
1,2-Dibromoethane (EDB)	1.55	5	5.4 - 300	0.36	1	1 - 1
Dibromomethane	1.53	5	5.4 - 300	0.44	1	1 - 1
1,2-Dichlorobenzene	1.61	5	5.4 - 300	0.24	1	1 - 1
1,3-Dichlorobenzene	1.5	5	5.4 - 300	0.26	1	1 - 1
1,4-Dichlorobenzene	1.25	5	5.4 - 300	0.24	1	1 - 1
trans-1,4-Dichloro-2-butene	1.85	5	5.4 - 300	0.6	1	1 - 1
Dichlorodifluoromethane	1.29	10	11 - 610	0.23	2	2 - 2
1,1-Dichloroethane	1.15	5	5.4 - 300	0.17	1	1 - 1
1,2-Dichloroethane	1.64	5	5.4 - 300	0.28	1	1 - 1
1,1-Dichloroethene	1.14	5	5.4 - 300	0.2	1	1 - 1
cis-1,2-Dichloroethene	1.12	2.5	2.7 - 150	0.26	1	1 - 1
trans-1,2-Dichloroethene	1.14	2.5	2.7 - 150	0.27	0.5	0.5 - 0.5
1,2-Dichloroethene (total)	2.09	5	5.4 - 300	0.53	1	1 - 1
1,2-Dichloropropane	1.37	5	5.4 - 300	0.21	1	1 - 1
cis-1,3-Dichloropropene	1.28	5	5.4 - 300	0.28	1	1 - 1
trans-1,3-Dichloropropene	1.54	5	5.4 - 300	0.42	1	1 - 1
1,4-Dioxane	154	500	540 - 30000	16.74	200	200 - 200
Ethanol	72.25	500	540 - 30000	72.36	200	200 - 200

Table 2
Volatile Organic Compound Parameter List, Quantification Limits, and Methods
Ashland Inc. / Clearfield DSO

Analyte	Soil (µg/kg)			Water (µg/l)		
	MDL	Proposed RL	Actual RL Range	MDL	Proposed RL	Actual RL Range
Ethylbenzene	1.27	5	5.4 - 300	0.28	1	1 - 1
Ethyl methacrylate	1.11	5	5.4 - 300	0.25	1	1 - 1
Hexane	1.44	5	5.4 - 300	0.25	1	1 - 1
2-Hexanone	4.39	20	32 - 1200	0.7	5	5 - 5
Iodomethane	1.22	5	5.4 - 300	0.23	1	1 - 1
Methylene chloride	1.25	5	5.4 - 300	0.89	1	1 - 1
4-Methyl-2-pentanone	3.75	20	21 - 1200	0.79	5	5 - 5
Methyl tert-butyl ether	0.78	5	21 - 1200	0.21	5	5 - 5
Styrene	1.37	5	5.4 - 300	0.27	1	1 - 1
1,1,2,2-Tetrachloroethane	1.66	5	5.4 - 300	0.31	1	1 - 1
Tetrachloroethene	1.29	5	5.4 - 300	0.36	1	1 - 1
Tetrahydrofuran	1.31	20	21 - 1200	0.32	5	5 - 5
Toluene	2.32	5	5.4 - 300	0.29	1	1 - 1
1,1,1-Trichloroethane	1.13	5	5.4 - 300	0.26	1	1 - 1
1,1,2-Trichloroethane	1.61	5	5.4 - 300	0.39	1	1 - 1
Trichloroethene	1.13	5	5.4 - 300	0.22	1	1 - 1
Trichlorofluoromethane	1.16	10	11 - 610	0.28	2	2 - 2
1,2,3-Trichloropropane	1.88	5	5.4 - 300	0.29	1	1 - 1
Trichlorotrifluoroethane	1	20	21 - 1200	0.21	1	1 - 1
Vinyl acetate	1.49	10	11 - 610	0.31	2	2 - 2
Vinyl chloride	1.01	10	5.4 - 300	0.95	1	1 - 1
m-Xylene & p-Xylene	1.25	2.5	2.7 - 150	0.69	2	2 - 2
o-Xylene	1.14	2.5	2.7 - 150	0.27	1	1 - 1
Xylenes (total)	2.36	5	5.4 - 300	0.95	2	2 - 2

Method = USEPA SW-846 Method 8260B

Specific detection and reporting limits are highly matrix dependent. The method detection limits (MDL) and reporting limits (RL) listed herein are provided by STL of Arvada, Colorado, for guidance and may not always be achievable.

Reporting limits listed for soil are based on wet weight.

Reporting limits calculated by the laboratory for soil, calculated on dry weight basis, will be higher.

-- Compound not analyzed for in this matrix.

Table 3
Semivolatile Organic Compound Parameter List, Quantification Limits, and Methods
Ashland Inc. / Clearfield DSO

Analyte	Soil (µg/kg)			Water (µg/l)		
	MDL	Propoded RL	Actual RL Range	MDL	Proposed RL	Actual RL Range
Acenaphthene	34.7	330	330 - 420	1.39	10	10 - 250
Acenaphthylene	36.5	330	330 - 420	1.73	10	10 - 250
Aniline	70.5	330	330 - 420	2.77	10	10 - 250
Anthracene	52.9	330	330 - 420	1.43	10	10 - 250
Azobenzene	35.2	330	330 - 420	1.75	10	10 - 250
Benzidine	160	3300	3300 - 4200	Not available	100	100 - 2500
Benzo(a)anthracene	42.4	330	330 - 420	1.1	10	10 - 250
Benzo(b)fluoranthene	37.9	330	330 - 420	2.21	10	10 - 250
Benzo(k)fluoranthene	79.8	330	330 - 420	1.91	10	10 - 250
Benzoic acid	409.4	1600	1600 - 2000	18.66	50	50 - 1200
Benzo(ghi)perylene	42.9	330	330 - 420	2	10	10 - 250
Benzo(a)pyrene	47.2	330	330 - 420	1.73	10	10 - 250
Benzyl alcohol	75.2	330	330 - 420	3.75	10	10 - 250
bis(2-Chloroethoxy)methane	51.1	330	330 - 420	2.5	10	10 - 250
bis(2-Chloroethyl) ether	49.4	330	330 - 420	3	10	10 - 250
bis(2-Chloroisopropyl) ether	47.3	330	330 - 420	1.19	10	10 - 250
bis(2-Ethylhexyl) phthalate	58.4	330	330 - 420	2.02	10	10 - 250
4-Bromophenyl phenyl ether	45.1	330	330 - 420	2.72	10	10 - 250
Butyl benzyl phthalate	45.8	330	330 - 420	2.89	10	10 - 250
Carbazole	48.8	330	330 - 420	1.73	10	10 - 250
4-Chloroaniline	64.9	330	330 - 420	6.86	15	10 - 250
4-Chloro-3-methylphenol	58.7	330	330 - 420	2.04	10	10 - 250
2-Chloronaphthalene	33	330	330 - 420	1.36	10	10 - 250
2-Chlorophenol	50.1	330	330 - 420	2.16	10	10 - 250
4-Chlorophenyl phenyl ether	53.8	330	330 - 420	1.62	10	10 - 250
Chrysene	53.2	330	330 - 420	1.81	10	10 - 250
Dibenz(a,h)anthracene	51.7	330	330 - 420	2.21	10	10 - 250
Dibenzofuran	43.5	330	330 - 420	1.54	10	10 - 250
Di-n-butyl phthalate	57.9	330	330 - 420	2.27	10	10 - 250
1,2-Dichlorobenzene	52.7	330	330 - 420	2.06	10	10 - 250
1,3-Dichlorobenzene	58.3	330	330 - 420	1.44	10	10 - 250
1,4-Dichlorobenzene	50.4	330	330 - 420	2.09	10	10 - 250
3,3'-Dichlorobenzidine	167.8	1600	1600 - 2000	5.08	50	50 - 1200
2,4-Dichlorophenol	45.9	330	330 - 420	2.2	10	10 - 250
Diethyl phthalate	41.7	660	660 - 830	1.24	10	10 - 250

Table 3
Semivolatile Organic Compound Parameter List, Quantification Limits, and Methods
Ashland Inc. / Clearfield DSO

Analyte	Soil (µg/kg)			Water (µg/l)		
	MDL	Propoded RL	Actual RL Range	MDL	Proposed RL	Actual RL Range
2,4-Dimethylphenol	67.5	330	330 - 420	2.79	10	10 - 250
Dimethyl phthalate	38.4	330	330 - 420	1.78	10	10 - 250
4,6-Dinitro-2-methylphenol	191.5	1600	1600 - 2000	2.61	50	50 - 1200
2,4-Dinitrophenol	485.1	1600	1600 - 2000	5.77	50	50 - 1200
2,4-Dinitrotoluene	43.6	330	330 - 420	1.44	10	10 - 250
2,6-Dinitrotoluene	51.9	330	330 - 420	1.15	10	10 - 250
Di-n-octyl phthalate	46.3	330	330 - 420	2.01	10	10 - 250
Fluoranthene	56.8	330	330 - 420	1.92	10	10 - 250
Fluorene	41.1	330	330 - 420	1.6	10	10 - 250
Hexachlorobenzene	48.5	330	330 - 420	2.73	10	10 - 250
Hexachlorobutadiene	41.8	330	330 - 420	2.25	10	10 - 250
Hexachlorocyclopentadiene	33	1600	1600 - 2000	5	50	50 - 1200
Hexachloroethane	61.5	330	330 - 420	1.72	10	10 - 250
Indene	56.7	330	330 - 420	1.9	100	100 - 2500
Indeno(1,2,3-cd)pyrene	53	330	330 - 420	1.73	10	10 - 250
Isophorone	52.5	330	330 - 420	2.01	10	10 - 250
2-Methylnaphthalene	57.5	330	330 - 420	1.6	10	10 - 250
1-Methylnaphthalene	56.2	330	330 - 420	2.31	10	10 - 250
2-Methylphenol (o-Cresol)	44	330	330 - 420	3.18	10	10 - 250
4-Methylphenol (p-Cresol)	58.9	330	330 - 420	3.27	10	10 - 250
3-Methylphenol & 4-Methylphenol	58.9	330	330 - 420	5.1	10	10 - 250
Methyl styrene	51.3	330	330 - 420	1.97	10	10 - 250
Naphthalene	50.8	330	330 - 420	1.76	10	10 - 250
2-Nitroaniline	44.9	1600	1600 - 2000	2.52	50	50 - 1200
3-Nitroaniline	57	1600	1600 - 2000	3.58	50	50 - 1200
4-Nitroaniline	68.4	1600	1600 - 2000	2.18	50	50 - 1200
Nitrobenzene	68	330	330 - 420	2.45	10	10 - 250
2-Nitrophenol	42.8	330	330 - 420	2.77	10	10 - 250
4-Nitrophenol	160	1600	1600 - 2000	7.14	50	50 - 1200
N-Nitrosodimethylamine	57.8	330	330 - 420	2.33	10	10 - 250
N-Nitrosodiphenylamine	56	330	330 - 420	2.91	10	10 - 250
N-Nitrosodi-n-propylamine	62.9	330	330 - 420	2.33	10	10 - 250
2,2'-oxybis (1-Chloropropane)	47.3	330	330 - 420	1.19	10	10 - 250
Pentachlorophenol	160	1600	1600 - 2000	5	50	50 - 1200
Phenanthrene	41.7	330	330 - 420	2.01	10	10 - 250

Table 3
Semivolatile Organic Compound Parameter List, Quantification Limits, and Methods
Ashland Inc. / Clearfield DSO

Analyte	Soil (µg/kg)			Water (µg/l)		
	MDL	Propoded RL	Actual RL Range	MDL	Proposed RL	Actual RL Range
Phenol	50.3	330	330 - 420	1.75	10	10 - 250
Pyrene	38	330	330 - 420	2	10	10 - 250
Pyridine	160	660	660 - 830	6.04	20	20 - 500
1,2,4-Trichlorobenzene	35.6	330	330 - 420	1.78	10	10 - 250
2,4,5-Trichlorophenol	33	330	330 - 420	2.45	10	10 - 250
2,4,6-Trichlorophenol	36.4	330	330 - 420	2.27	10	10 - 250

Method = USEPA SW-846 Method 8270C

Specific detection and reporting limits are highly matrix dependent. The detection limits and reporting limits listed herein are provided by STL of Arvada, Colorado, for guidance and may not always be achievable.

Reporting limits listed for soil are based on wet weight.

Reporting limits calculated by the laboratory for soil, calculated on dry weight basis, will be higher.

-- Compound not analyzed for in this matrix.

Table 4
Inorganic Parameter List, Quantification Limits, and Methods
Ashland Inc. / Clearfield DSO

Analyte	Method	Soil (mg/kg)			Water (µg/l)		
		MDL	Proposed RL	Actual RL Range	MDL	Proposed RL	Actual RL Range
Aluminum	6010B	3.1	10	10 - 13	22	100	100 - 100
Antimony[3]	6010B	0.35	1	1 - 1.3	3.4	10	10 - 10
Arsenic[3]	6010B	0.39	1	1 - 1.3	3.5	10	10 - 10
Barium	6010B	0.12	1	1 - 1.3	1.5	10	10 - 10
Beryllium	6010B	0.14	0.5	0.5 - 0.63	0.5	5	5 - 5
Boron	6010B	0.51	10	10 - 13	6.2	100	100 - 100
Cadmium[3]	6010B	0.1	0.5	0.5 - 0.63	0.5	5	5 - 5
Calcium	6010B	3.23	20	20 - 25	48	200	200 - 200
Chromium	6010B	0.44	1	1 - 1.3	2.1	10	10 - 10
Cobalt[3]	6010B	0.15	1	1 - 1.3	1	10	10 - 10
Copper	6010B	0.27	2	2 - 2.5	2.1	10	10 - 10
Iron	6010B	2	10	10 - 13	12	100	100 - 100
Lead[3]	6010B	0.24	0.8	0.8 - 1	1.47	3	3 - 3
Lithium	6010B	0.22	5	5 - 6.3	2.1	10	10 - 10
Magnesium	6010B	1.53	20	20 - 25	11	200	200 - 200
Manganese	6010B	0.14	1	1 - 1.3	0.85	10	10 - 10
Molybdenum[3]	6010B	0.24	2	2 - 2.5	1.8	20	20 - 20
Nickel	6010B	0.72	4	4 - 5	3.8	40	40 - 40
Phosphorus	6010B	4	300	300 - 380	61	3000	3000 - 3000
Potassium	6010B	30.6	300	300 - 380	180	3000	3000 - 3000
Selenium[3]	6010B	0.45	1.3	1.3 - 1.6	2.61	5	5 - 5
Silver[3]	6010B	0.12	1	1 - 1.3	0.54	10	10 - 10
Sodium	6010B	120	500	500 - 630	350	5000	5000 - 5000
Strontium	6010B	0.15	1	1 - 1.3	0.5	10	10 - 10
Thallium[3]	6010B	0.42	1.2	1.2 - 1.5	4.9	10	10 - 10
Tin[3]	6010B	0.42	10	10 - 13	1.48	100	100 - 100
Titanium	6010B	0.2	1	1 - 1.3	1	10	10 - 10
Vanadium	6010B	0.35	1	2 - 2.5	1.3	10	10 - 10
Zinc	6010B	0.73	2	2 - 2.5	2.8	20	20 - 20
Mercury	7471A, 7470A	0.0037	0.033	0.033 - 0.042	0.028	0.2	0.2 - 0.2
Total Cyanide	9012A	0.264	0.5	0.5 - 1.1	0.0065	0.01	0.01 - 0.01
Chloride	9056	1	30	30 - 30	0.1	3	3 - 3
Orthophosphate	9056	0.2	5	5 - 5	0.02	0.5	0.5 - 0.5

Specific detection and reporting limits are highly matrix dependent. The detection limits and reporting limits listed herein are provided by STL of Arvada, Colorado, for guidance and may not always be achievable. Reporting limits listed for soil are based on wet weight. Reporting limits calculated by the laboratory for soil, calculated on dry weight basis, will be higher.

[3] These metals will be analyzed by Trace ICP.

Table 5
Summary of Physical Soil Data
Ashland Inc. / Clearfield DSO

Soil Boring Location	Depth Below Ground (feet)	% Gravel	% Sand	%Silt	% Clay	Unified Soil Classification System	% Solids
BH003	4.5-6.0	47.3	45.1	5.4	2.2	GM	96.2
BH011	6.0-7.0	0.0	0.6	56.3	43.1	CL	84.1
BH015	10.0-12.0	1.0	24.2	43.8	31.0	CL	84.2

Table 6
Soil Boring Headspace Screening Results Summary
Ashland Inc. / Clearfield DSO

Soil Boring Location	Depth Below Ground (feet)					
	0-2	2-4	4-6	6-8	8-10	10-12
BH001	0.0	NA	1555*	NA	130	--
BH002	0.0	NA	35.8*	--	--	--
BH003	0.0	21.4*	521*	NA	--	--
BH004	0.0	NA*a	10.5*a	NA	8.5	7.0
BH005	NA	8.5	NA*	18.9	NA	1200
BH006	NA	30*	27	NA	15.5	--
BH007	0.0	400*a	NA*a	--	--	--
BH008	0.0	19.1*a	351*a	--	--	--
BH009	0.0	NA*	8.2	5.1	--	--
BH010	0.0	NA	3.1*	9.1	8.1	8.9
BH011	0.0	11.0	NA	5.1*	7.1	--
BH012	0.0	NA	112	NA*	512*	10.1
BH013	0.0	6.8*	NA	6.9	NA	200*
BH014	0.0	NA	10.5*	--	--	--
BH015	0.0	NA	10.1*	7.0	NA	5.5
BH016	0.0	NA*a	580*a	0.0*	82.0	NA

Headspace readings were assigned to the closest two foot interval.
Headspace readings in parts per million.
* = Laboratory sample was collected from within this interval.
a = Laboratory sample was collected from a subsection of both intervals.
NA = No headspace reading available for the interval.
-- = Interval is deeper than boring termination.

Table 7
Soil Analytical Results Summary
Volatile Organic Compounds
Ashland Inc. / Clearfield DSO

Analyte	Generic SSLs (a)				Sample Location																				
VOCs (ug/kg)	Ingestion-Dermal	Inhalation Volatiles	Inhalation of Fugitive Particulates	Migration to Groundwater DAF*20	BH001 4.5'-6'	BH002 4'-5'	BH003 2'-4'	BH003 6'	BH004 2.5'-4.5'	BH005 5'-6'	BH006 2.5'-3.5'	BH007 3.5'-4.5'	BH007 FD-2	BH008 3.5'-4.5'	BH009 3'-4'	BH010 4'-6'	BH011 6'-7'	BH012 6'-7.5'	BH012 9'	BH013 3.5'-4'	BH013 12'	BH014 4'-5'	BH015 5'-6'	BH016 3.5'	BH016 8'	Trip Blank 1 ug/L	Trip Blank 2 ug/L	Equip Rinsate #2
Ethanol	NE	NE	NE	NE	<560	<30,000	<540	<950	<610	<28,000	<590	<660	<650	<610	<570	<30,000	<600	<610	<610	580	<30,000	<620	NA	<30,000	<800	<200	<200	<200
Acetone	110,000,000 b,c	d	NE	16,000 b	49	<1,200	27	110	86	<1,100	83	260	150	16 J	41	<1,200	81	63	80	84	<1,200	160	NA	<1,200	140	<10	8.8 J	8.8 J
Benzene	58,000 c,e	1,000 e	NE	30	<5.6	<300	<5.4	3.3 J	2.9 J	<280	2.0 J	<6.6	<6.5	<6.1	<110	<300	2.0 J	2.0 J	<6.1	<5.8	<300	1.1 J	NA	<300	2.0 J	<1.0	<1.0	<1.0
Bromodichloromethane	51,000 c,e	d	NE	600	<5.6	<300	<5.4	<9.5	<6.1	<280	<5.9	<6.6	<6.5	<6.1	<5.7	<300	<6.0	<6.1	<6.1	<5.8	<300	<6.2	NA	<300	<8.0	<1.0	<1.0	1.8
Bromoform	400,000 c,e	88,000 e	NE	800	<5.6	<300	<5.4	<9.5	<6.1	<280	<5.9	<6.6	<6.5	<6.1	<5.7	<300	<6.0	<6.1	<6.1	<5.8	<300	<6.2	NA	<300	<8.0	<1.0	<1.0	0.65 J
2-Butanone	NE	NE	NE	NE	7.0 J	<1,200	<21	17 J	16 J	<1,100	13 J	<26	<26	<25	5.9 J	<1,200	16 J	11 J	16 J	14 J	<1,200	37	NA	<1,200	26 J	<5.0	<5.0	<5.0
Carbon disulfide	110,000,000 b,c	720,000	NE	32,000 b	<5.6	<300	<5.4	4.5 J	3.6 J	<280	2.3 J	<6.6	<6.5	<6.1	<5.7	<300	1.9 J	1.2 J	<6.1	5.8	<300	<6.2	NA	<300	<8.0	<1.0	<1.0	<1.0
Chloroform	520,000 c,e	500 e	NE	600	<11	<600	<11	<19	<12	<560	<12	<13	<13	<12	<11	<600	<12	<12	<12	<12	<610	<12	NA	<600	<16	<1.0	<1.0	2.2
Dibromochloromethane	NE	NE	NE	NE	<5.6	<300	<5.4	<9.5	<6.1	<280	<5.9	<6.6	<6.5	<6.1	<5.7	<300	<12	<6.1	<6.1	<5.8	<300	<6.2	NA	<300	<8.0	<1.0	<1.0	2.4
1,1-Dichloroethane	110,000,000 b,c	1,700,000	NE	23,000 b	4.8 J	<300	<5.4	<9.5	1.5 J	<280	<5.9	<6.6	<6.5	<6.1	<5.7	<300	<6.0	<6.1	<6.1	<5.8	<300	<6.2	NA	<300	<8.0	<1.0	<1.0	<1.0
cis-1,2 Dichloroethene	11,000,000 b,c	d	NE	400	7.6	<150	<2.7	<4.8	4.6	62 J	2.8 J	<3.3	1.5 J	<3.1	2.0 J	<150	<3.0	2.3 J	<3.0	<2.9	39 J	2.2 J	NA	<150	3.2 J	<1.0	<1.0	<1.0
1,2 Dichloroethene (total)	NE	NE	NE	NE	7.6	<300	<5.4	<9.5	4.6 J	<280	2.8 J	<6.6	<6.5	<6.1	2.0 J	<300	<6.0	2.3 J	<6.1	<5.8	<300	2.2 J	NA	<300	3.2 J	<1.0	<1.0	<1.0
Ethylbenzene	110,000,000 b,c	400,000	NE	13,000	3.0 J	1,600	<5.4	26	5.9 J	880	11	<6.6	<6.5	7.3	5.0 J	1,100	3.2 J	7.2	<6.1	<5.8	<300	<6.2	NA	1,100	100	<1.0	<1.0	<1.0
4-Methyl-2-pentanone	NE	NE	NE	NE	<22	<1,200	<21	<38	<24	<1,100	<24	<26	<26	<25	<23	<1,200	<24	<24	<24	<23	<1,200	<6.2	NA	<1,200	<32	<5.0	<5.0	<5.0
Methylene Chloride	420,000 c,e	22,000 e	NE	20 e	<5.6	<300	<5.4	<9.5	<6.1	<280	<5.9	<6.6	<6.5	1.9 J,B	<5.7	<300	<6.0	<6.1	<6.1	<5.8	<300	<6.2	NA	<300	<8.0	<5.0	<5.0	<5.0
Tetrachloroethene	61,000 c,e	18,000 e	NE	60	<5.6	**100 J**	<5.4	<9.5	<6.1	**300**	<5.9	4.1 J	3.8 J	<6.1	1.9 J	53 J	<6.0	<6.1	<6.1	5.8	**290 J**	<6.2	NA	**200 J**	<8.0	<1.0	<1.0	<1.0
Tetrahydrofuran	NE	NE	NE	NE	7.5 J	<1,200	<21	<38	<24	<1,100	<24	<26	<26	<25	<23	<1,200	<24	<24	<24	<23	<1,200	<25	NA	<1,200	<32	<5.0	<5.0	<1.0
Toluene	230,000,000 c,e	d	NE	12,000	0.93 J	<300	1.3 J	19	3.8 J	<280	2.9 J	1.2 J	1.1 J	<6.1	1.0 J	<300	1.1 J	<6.1	<6.1	1.1 J	<300	1.2 J	NA	56 J	3.4 J	<1.0	<1.0	<1.0
m- & p-Xylene	1,000,000,000 b,c	d	NE	210,000	3.2	2,000	<2.7	59	6.4	900	23	8.2	9.7	26	49	1,700	9.7	7.0	<3.0	<2.9	<150	3.0 J	NA	3,400	24	<2.0	<2.0	<2.0
o-Xylene	1,000,000,000 b,c	d	NE	190,000	1.6 J	320	<2.7	29	4.9	210	9.5	2.9 J	3.7	13	25	200	1.4 J	2.1 J	<3.0	<2.9	<150	1.6 J	NA	830	4.9	<1.0	<1.0	<1.0
Xylenes (total)	NE	NE	NE	NE	4.9 J	2,300	<5.4	88	11	1,100	33	11	13	39	74	1,900	11	9.1	<6.1	<5.8	<300	4.6 J	NA	4,300	29	<2.0	<2.0	<2.0
Percent Moisture	NE	NE	NE	NE	11	16	6.6	48	17	11	16	24	23	19	12	17	17	18	17	14	18	19	13	17	37	NA	NA	NA

Notes:
Bold indicates the exceedance of a soil screening level (SSL).
a = Commercial/Industrial Scenario: Outdoor Worker Receptor (USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites; Peer Review Draft, March 2001).
b = Calculated values correspond to a noncancer hazard quotient of 1.
c = No dermal absorption data available. Calculated based on ingestion data only.
d = No toxicity data for that route of exposure.
e = Calculated values correspond to a cancer risk of 1 in 1,000,000.
j = SSL is based on RfD for mercuric chloride.
k = A screening level of 400 mg/kg has been set for lead, based on "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA, 1994".
l = SSL is based on RfD for thallium chloride.
NE = Not established
NA = Not analyzed
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result. Result is less than the reportable limit.
DAF*20 = Dilution Attenuation Factor times 20.

Table 8
Soil Analytical Results Summary
Semivolatile Organic Compounds
Ashland Inc. / Clearfield DSO

Analyte	Generic SSLs				Sample Location																				
	Ingestion-Dermal	Inhalation Volatiles	Inhalation of Fugitive Particulates	Migration to Groundwater DAF*20	BH001 4.5'-6'	BH002 4'-5'	BH003 2'-4'	BH003 6'	BH004 2.5'-4.5'	BH005 5'-6'	BH006 2.5'-3.5'	BH007 3.5'-4.5'	BH007 FD-2	BH008 3.5'-4.5'	BH009 3'-4'	BH010 4'-6'	BH011 6'-7'	BH012 6'-7.5'	BH012 9'	BH013 3.5'-4'	BH013 12'	BH014 4'-5'	BH015 5'-6'	BH016 3.5'	BH016 8'	Trip Blank 1 ug/L	Trip Blank 2 ug/L	Equip Rinsate #2
SVOCS (ug/kg)																											
Anthracene	180,000,000 b	d	NE	12,000 b	<330	<330	<350	NA	<330	<330	<330	<330	<330	<330	<330	<400	<420	NA	NA	NA	NA	<390	NA	120 J	NA	NA	NA	<10
Benzo (a) anthracene	2,000 e	d	NE	2,000 e	<330	<330	<350	NA	<330	<330	<330	<330	<330	480	<330	<400	<420	NA	NA	NA	NA	<390	NA	360 J	NA	NA	NA	<10
Benzo (b) fluoranthene	2,000 e	d	NE	5,000 e	<330	<330	<350	NA	<330	<330	<330	<330	<330	560	<330	<400	<420	NA	NA	NA	NA	<390	NA	170 J	NA	NA	NA	<10
Benzo (k) fluoranthene	23,000 e	c	NE	49,000 e	<330	<330	<350	NA	<330	<330	<330	<330	<330	410	<330	<400	<420	NA	NA	NA	NA	<390	NA	220 J	NA	NA	NA	<10
Benzo (g,h,i) perylene	NE	NE	NE	NE	<330	<330	<350	NA	<330	<330	<330	<330	<330	1,300	<330	<400	<420	NA	NA	NA	NA	<390	NA	50 J	NA	NA	NA	<10
Benzo (a) pyrene	200 e	d	NE	8,000	<330	<330	<350	NA	<330	<330	<330	<330	<330	**930**	<330	<400	<420	NA	NA	NA	NA	<390	NA	190 J	NA	NA	NA	<10
bis (2-Ethylhexyl) phthalate	140,000 e	d	NE	3,600,000	<330	<330	<350	NA	<330	<330	<330	<330	<330	<330	<330	<400	<420	NA	NA	NA	NA	<390	NA	230 J	NA	NA	NA	<10
Chrysene	230,000 e	d	NE	160,000 e	<330	<330	<350	NA	<330	<330	<330	<330	<330	1,600	<330	<400	<420	NA	NA	NA	NA	<390	NA	300 J	NA	NA	NA	<10
Dibenz (a,h) anthracene	200 e	d	NE	2,000 e	<330	<330	<350	NA	<330	<330	<330	<330	<330	**370**	<330	<400	<420	NA	NA	NA	NA	<390	NA	<370	NA	NA	NA	<10
Fluoranthene	24,000,000 b	d	NE	4,300,000 b	<330	<330	<350	NA	<330	<330	<330	<330	<330	1,000	<330	<400	<420	NA	NA	NA	NA	<390	NA	1,300	NA	NA	NA	<10
Indeno (1,2,3-cd) pyrene	2,000 e	d	NE	14,000 e	<330	<330	<350	NA	<330	<330	<330	<330	<330	1,100	<330	<400	<420	NA	NA	NA	NA	<390	NA	<370	NA	NA	NA	<10
Naphthalene	12,000,000 b	240,000 b	NE	84,000 b	<330	<330	<350	NA	<330	<330	<330	<330	<330	<330	<330	<400	<420	NA	NA	NA	NA	<390	NA	350 J	NA	NA	NA	<10
Phenanthrene	NE	NE	NE	NE	<330	<330	<350	NA	<330	<330	<330	<330	<330	680	<330	<400	<420	NA	NA	NA	NA	<390	NA	210 J	NA	NA	NA	<10
Phenol	410,000,000 b	c	NE	100,000 b	<330	<330	<350	NA	<330	<330	<330	<330	<330	<330	<330	<400	<420	NA	NA	NA	NA	170 J	NA	<370	NA	NA	NA	<10
Pyrene	18,000,000 b	c	NE	4,200,000 b	<330	<330	<350	NA	<330	<330	<330	<330	<330	990	<330	<400	<420	NA	NA	NA	NA	<390	NA	1,200	NA	NA	NA	<10

Notes:
Bold indicates the exceedance of a soil screening level (SSL).
a = Commercial/Industrial Scenario: Outdoor Worker Receptor (USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites; Peer Review Draft, March 2001).
b = Calculated values correspond to a noncancer hazard quotient of 1.
c = No dermal absorption data available. Calculated based on ingestion data only.
d = No toxicity data for that route of exposure.
e = Calculated values correspond to a cancer risk of 1 in 1,000,000.
j = SSL is based on RfD for mercuric chloride.
k = A screening level of 400 mg/kg has been set for lead, based on "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA, 1994".
l = SSL is based on RfD for thallium chloride.
NE = Not established
NA = Not analyzed
J = Estimated result. Result is less than the reportable limit.
DAF*20 = Dilution Attenuation Factor times 20.

Table 9
Soil Analytical Results Summary
Soil Inorganic Compounds
Ashland Inc. / Clearfield DSO

Analyte	Generic SSLs				Sample Location																						
	Ingestion-Dermal	Inhalation Volatiles	Inhalation of Fugitive Particulates	Migration to Groundwater DAF*20	BH001 4.5'-6'	BH002 4'-5'	BH003 2'-4'	BH003 6'	BH004 2.5'-4.5'	BH005 5'-6'	BH006 2.5'-3.5'	BH007 3.5'-4.5'	BH007 FD-2	BH008 3.5'-4.5'	BH009 3'-4'	BH010 4'-6'	BH011 6'-7'	BH012 6'-7.5'	BH012 9'	BH013 3.5'-4'	BH013 12'	BH014 4'-5'	BH015 5'-6'	BH015 Field Dup	BH016 3.5'	BH016 8'	Trip Blank 1 ug/L	Trip Blank 2 ug/L	Equip Rinsate #2 ug/L
INORGANICS																												
pH (standard units)	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.8	8.1	NA	NA	NA	NA	NA
Chloride (mg/kg)	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<30	<30	NA	NA	NA	NA	NA
Phosphate (mg/kg)	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5.0	<5.0	NA	NA	NA	NA	NA
METALS (mg/kg)																												total
Aluminum	NE	NE	NE	NE	6,300	11,000	1,700	NA	19,000	17,000	8,000	4,200	4,100	2,200	16,000	21,000	14,000	NA	NA	NA	NA	8,900	NA	NA	17,000	NA	NA	NA	<100
Arsenic	2 e	NE	1,400 e	29	**3.3**	**6.8**	**2.2**	NA	**5.8**	**6.5**	**6.8**	**3.2**	**2.8**	1.8	**4.8**	**8.4**	**7.8**	NA	NA	NA	NA	**7.8**	NA	NA	**5.8**	NA	NA	NA	<15
Barium	79,000 b,c	NE	1,000,000 b	1,600	41	81	27	NA	90	96	63	44	41	21	82	120	120	NA	NA	NA	NA	75	NA	NA	82	NA	NA	NA	<10
Beryllium	2,300 c,e	NE	2,600 e	63	<0.50	0.55	0.20 B	NA	0.86	0.78	<0.50	<0.50	<0.50	<0.50	0.73	0.97	0.68	NA	NA	NA	NA	0.54 B	NA	NA	0.70	NA	NA	NA	<5.0
Boron	NE	NE	NE	NE	<10	<10	<11	NA	11	<10	<10	<10	<10	<10	<10	15	8.9 B	NA	NA	NA	NA	7.1 B	NA	NA	5.0 B	NA	NA	NA	<100
Calcium	NE	NE	NE	NE	22,000	11,000	14,000 J	NA	4,100	4,500	47,000	13,000	10,000	5,800	3,600	5,200 J	8,200 J	NA	NA	NA	NA	81,000 J	NA	NA	5,800 J	NA	NA	NA	<200
Chromium	3,400 b,c	NE	510 e	38	13	16	7.6 J	NA	22	19	12	8.5	7.9	5.7	18	25 J	18 J	NA	NA	NA	NA	13 J	NA	NA	39 J	NA	NA	NA	<10
Cobalt	NE	NE	NE	NE	5.5	4.7	1.3 J	NA	6.4	6.0	3.7	2	1.8	1.5	5.7	7.3 J	5.9 J	NA	NA	NA	NA	4.0 J	NA	NA	9.1 J	NA	NA	NA	<10
Copper	NE	NE	NE	NE	11	16	4.6	NA	14	14	6.0	5.1	4.3	3.7	13	17	18	NA	NA	NA	NA	13 J	NA	NA	11	NA	NA	NA	<10
Iron	NE	NE	NE	NE	9,500	9,800	3,300	NA	16,000	14,000	7,900	5,000	4,900	4,200	14,000	17,000	13,000	NA	NA	NA	NA	8,700	NA	NA	22,000	NA	NA	NA	<100
Lead	750 k	NE	k	k	5.6	9.9	2.2	NA	10	9.8	4.9	4.4	3.9	2.3	9.1	12	22	NA	NA	NA	NA	10	NA	NA	8.1	NA	NA	NA	<3.0
Lithium	NE	NE	NE	NE	9.7	10	1.7 B	NA	16	15	8.4	<5.0	<5.0	<5.0	14	19	13	NA	NA	NA	NA	9.3	NA	NA	14	NA	NA	NA	<10
Magnesium	NE	NE	NE	NE	8,300	4,100	1,600	NA	5,600	5,200	6,000	2,300	2,000	1,300	4,400	6,200	4,400	NA	NA	NA	NA	38,000	NA	NA	8,400	NA	NA	NA	<200
Manganese	NE	NE	NE	NE	140	180	50	NA	580	250	280	99	72	48	250	280	370	NA	NA	NA	NA	210	NA	NA	250	NA	NA	NA	<10
Molybdenum	NE	NE	NE	NE	<2.0	<2.0	0.23 B	NA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0.19 B	0.46 B	NA	NA	NA	NA	0.47 B	NA	NA	0.31 B	NA	NA	NA	<20
Nickel	23,000 b,c	NE	26,000 e	130	10	11	3.2 B	NA	16	14	8.0	5.0	4.4	<4.0	13	17	12	NA	NA	NA	NA	10	NA	NA	24	NA	NA	NA	<40
Phosphorus	NE	NE	NE	NE	<300	630	770	NA	770	820	650	460	460	380	650	880	830	NA	NA	NA	NA	*520*	NA	NA	890	NA	NA	NA	<3,000
Potassium	NE	NE	NE	NE	1,600	3,200	390	NA	5,100	4,600	1,900	1,100	1,100	470	5,000	5,900	4,300	NA	NA	NA	NA	2,700	NA	NA	3,600	NA	NA	NA	<3,000
Selenium	5,700 b,c	NE	c	5	<1.3	<1.3	<1.4	NA	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	0.82 B	1.2 B	NA	NA	NA	NA	<15	NA	NA	0.85 B	NA	NA	NA	<15
Silver	5,700 b,c	NE	c	34	<1.0	<1.0	0.14 B	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.30 B	0.28 B	NA	NA	NA	NA	0.22 B	NA	NA	0.22 B	NA	NA	NA	<10
Sodium	NE	NE	NE	NE	<500	<500	<530	NA	<500	<500	<500	<500	<500	<500	<500	83 B	<630	NA	NA	NA	NA	<590	NA	NA	<560	NA	NA	NA	<5,000
Strontium	NE	NE	NE	NE	26	33	20	NA	30	32	59	27	<20	10	29	40	36	NA	NA	NA	NA	60	NA	NA	38	NA	NA	NA	<10
Thallium	91 b,c,l	NE	c	0.7	<1.2	<1.2	<1.3	NA	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	**0.80 B,J**	**0.88 B,J**	NA	NA	NA	NA	0.39 B,J	NA	NA	0.41 B,J	NA	NA	NA	<10
Tin	NE	NE	NE	NE	<10	<10	0.50 B,J	NA	<10	<10	<10	<10	<10	<10	<10	0.68 B,J	1.6 B,J	NA	NA	NA	NA	0.82 B,J	NA	NA	1.0 B,J	NA	NA	NA	<100
Titanium	NE	NE	NE	NE	390	210	74	NA	240	260	97	130	100	91	230	320	310	NA	NA	NA	NA	150	NA	NA	210	NA	NA	NA	<10
Vanadium	7,900 b,c	NE	c	6,000 b	17	17	6.8	NA	26	23	16	9.1	8.3	5.8	22	31	22	NA	NA	NA	NA	15	NA	NA	36	NA	NA	NA	<10
Zinc	340,000 b,c	NE	c	12,000 b	25	46	13 J	NA	61	52	24	20	18	11	49	*64 J*	*61 J*	NA	NA	NA	NA	49 J	NA	NA	62 J	NA	NA	NA	<10
Cyanide, Total	1,600	c	40	40	6.4	1.7	9.1	NA	8.1	1.1	<0.50	0.86	<0.50	0.6	1.1	0.17 B	0.21 B	NA	NA	NA	NA	2.2	NA	NA	29 Q	NA	NA	NA	NA
Mercury	340 b,c j	14 b	NE	2	<0.033	<0.033	0.0045 B	NA	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	0.0082 B	0.021 B	NA	NA	NA	NA	0.010 B	NA	NA	0.0075 B	NA	NA	NA	<0.20

Notes:
Bold indicates the exceedance of a soil screening level (SSL).
a = Commercial/Industrial Scenario: Outdoor Worker Receptor (USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites; Peer Review Draft, March 2001).
b = Calculated values correspond to a noncancer hazard quotient of 1.
c = No dermal absorption data available. Calculated based on ingestion data only.
d = No toxicity data for that route of exposure.
e = Calculated values correspond to a cancer risk of 1 in 1,000,000.
j = SSL is based on RfD for mercuric chloride.
k = A screening level of 400 mg/kg has been set for lead, based on "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA, 1994".
l = SSL is based on RfD for thallium chloride.
NE = Not established
NA = Not analyzed
B = Analyte was detected between the instrument detection limit and the reporting limit and is considered an estimated value
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
DAF*20 = Dilution Attenuation Factor times 20.

Table 10
Groundwater Analytical Results Summary
Volatile Organic Compounds
Ashland Inc. / Clearfield DSO

Analyte VOCs (ug/L)	USEPA MCL	Sample Location BH001	BH001 FD#3	BH003	BH007	BH014	BH014	BH014	BH015	Trip Blank 1	Trip Blank 2	Decon Water	Equipment Rinsate (BH015)
Ethanol	NE	<200	<200	<200	<200	380 J	NA	NA	NA	<200	<200	<200	NA
Acetone	NE	<10	<10	4.5 J	95	100	NA	NA	NA	<10	8.8 J	210	NA
Benzene	5	<1.0	<1.0	<1.0	1.1	4.6 J	NA	NA	NA	<1.0	<1.0	1.1	NA
Bromodichloromethane	NE	<1.0	<1.0	<1.0	<1.0	<5.0	NA	NA	NA	<1.0	<1.0	0.35 J	NA
Bromoform	NE	<1.0	<1.0	<1.0	<1.0	<5.0	NA	NA	NA	<1.0	<1.0	<1.0	NA
2-Butanone	NE	<5.0	<5.0	<5.0	2.8 J	<25	NA	NA	NA	<5.0	<5.0	7.9	NA
Carbon disulfide	NE	2.4	1.8 J	<1.0	<1.0	<5.0	NA	NA	NA	<1.0	<1.0	<1.0	NA
Chloroform	NE	<1.0	<1.0	<1.0	<1.0	<5.0	NA	NA	NA	<1.0	<1.0	<0.57 J	NA
Dibromochloromethane	NE	<1.0	<1.0	<1.0	<1.0	<5.0	NA	NA	NA	<1.0	<1.0	<1.0	NA
1,1-Dichloroethane	NE	9.2	6.8	<1.0	<1.0	2.1 J	NA	NA	NA	<1.0	<1.0	<1.0	NA
cis-1,2 Dichloroethene	70	23	16	<1.0	0.46 J	3.3 J	NA	NA	NA	<1.0	<1.0	0.43 J	NA
1,2 Dichloroethene (total)	NE	23	16	<1.0	<1.0	3.3 J	NA	NA	NA	<1.0	<1.0	<1.0	NA
Ethylbenzene	700	13	8.7	<1.0	12	37	NA	NA	NA	<1.0	<1.0	4.6	NA
4-Methyl-2-pentanone	NE	<5.0	<5.0	<5.0	<5.0	26	NA	NA	NA	<5.0	<5.0	4.4 J	NA
Methylene Chloride	NE	<5.0	<5.0	<5.0	<5.0	<25	NA	NA	NA	<5.0	<5.0	<5.0	NA
Tetrachloroethene	5	<1.0	<1.0	<1.0	0.97 J	**6.1**	NA	NA	NA	<1.0	<1.0	<1.0	NA
Tetrahydrofuran	NE	3.7 J	<5.0	<5.0	<5.0	<25	NA	NA	NA	<5.0	<5.0	<5.0	NA
Toluene	1000	2.3	1.2	0.54 J	22	120	NA	NA	NA	<1.0	<1.0	15	NA
m- & p-Xylene	NE	7.1	4.3	0.53 J	47	170	NA	NA	NA	<2.0	<2.0	24	NA
o-Xylene	NE	4.4	2.6	<1.0	10	73	NA	NA	NA	<1.0	<1.0	9.8	NA
Xylenes (total)	10000	11	6.8	<2.0	57	240	NA	NA	NA	<2.0	<2.0	34	NA

Notes:
USEPA MCL = Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water.
Bold indicates an exceedance of a MCL.
TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.
NE = Not established
NA = Not analyzed
J = Estimated result. Result is less than the reportable limit.

Table 11
Groundwater Analytical Results Summary
Semivolatile Organic Compounds
Ashland Inc. / Clearfield DSO

Analyte SVOCs (ug/L)	USEPA MCL	Sample Location BH001	FD#3	BH003	BH007	BH014	BH014	BH014	BH015	Trip Blank	Decon Water	Equipment Rinsate (BH015)
Benzoic acid	NE	<50	<50	<50	<50	3,600	2,700	3,400	NA	NA	550	NA
Phenol	NE	<10	<10	<10	<10	450	320	410	NA	NA	70	NA

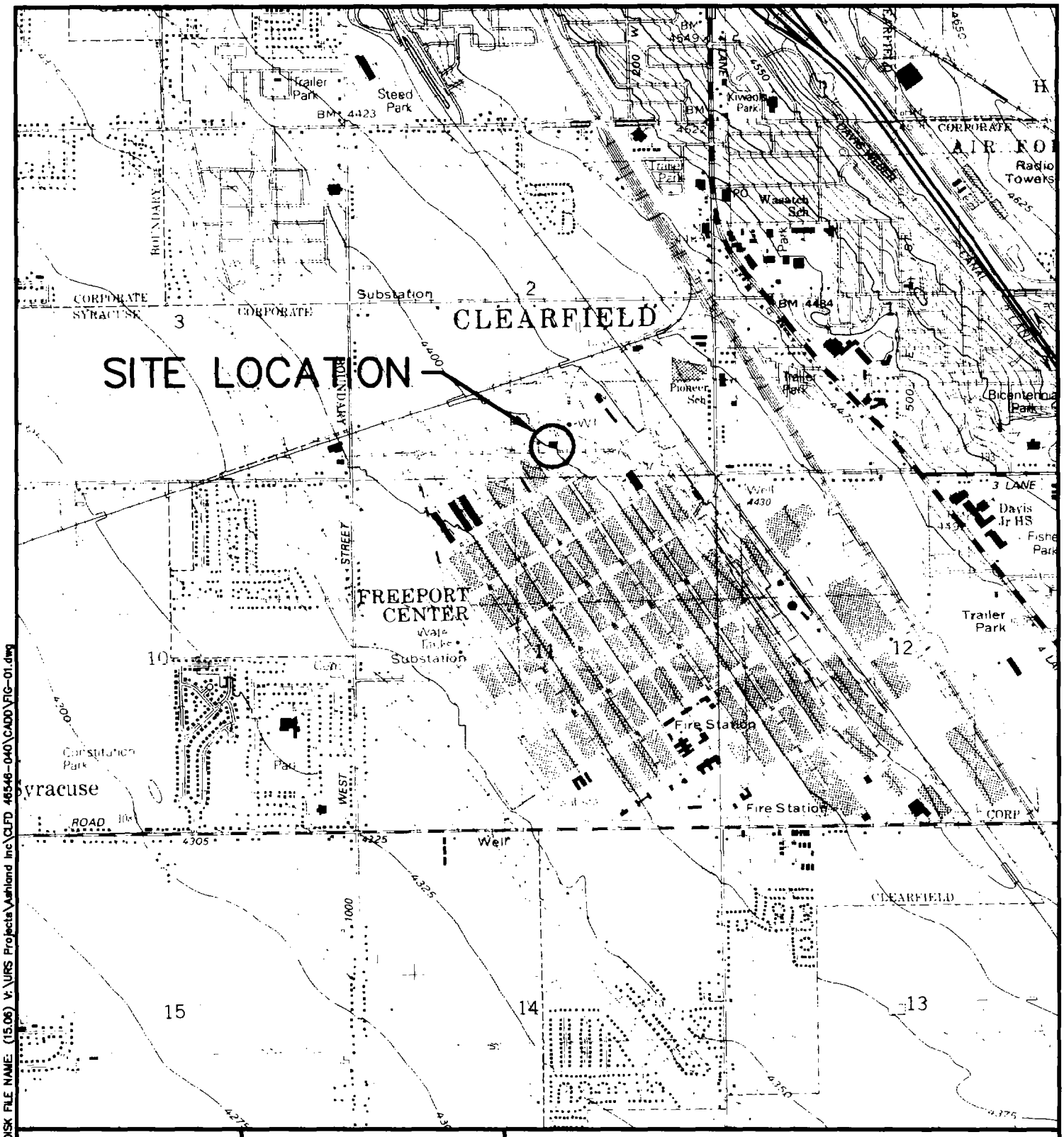
Notes:
USEPA MCL = Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water.
Bold indicates an exceedance of a MCL.
TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.
NE = Not established
NA = Not analyzed

Table 12
Groundwater Analytical Results Summary
Inorganics and Metals
Ashland Inc. / Clearfield DSO

Analyte	USEPA MCL	Sample Location BH001	FD#3	BH003	BH007	BH014	BH014	BH014	BH015	Trip Blank	Decon Water	Equipment Rinsate (BH015)
pH (standard units)	NE	NA	NA	NA	NA	NA	NA	NA	7.7	NA	NA	8.0
Chloride (mg/L)	NE	NA	NA	NA	NA	NA	NA	NA	35	NA	NA	<3.0
Phosphate (mg/L)	NE	NA	NA	NA	NA	NA	NA	NA	<0.50	NA	NA	<0.50
METALS, TOTAL (ug/L)												
Aluminum	NE	2,200	<100	320	910	3,700	3,400	3,200	NA	NA	27,000	NA
Antimony	6	<10	<10	4.1 B	<10	<10	<10	<10	NA	NA	<10	NA
Arsenic	10	**94**	**81**	**14 B**	9.4 B	**24**	**23**	**21**	NA	NA	**34**	NA
Barium	2000	260	220	280	250	170	160	160	NA	NA	270	NA
Boron	NE	210	190	160	120	87 B	<100	<100	NA	NA	<100	NA
Calcium	NE	110,000	95,000	74,000	60,000	90,000	87,000	79,000	NA	NA	78,000	NA
Chromium	100	<10	<10	1.2 B	1.7 B	2.9 B	<10	<10	NA	NA	71	NA
Cobalt	NE	<10	<10	1.4 B	<10	2.2 B	<10	<10	NA	NA	12	NA
Copper	1300 (TT)	<10	<10	12 J	2.4 B,J	36 J	37	35	NA	NA	270	NA
Iron	NE	10,000	5,400	640 J	1,000 J	2,600 J	1,900	1,500	NA	NA	32,000	NA
Lithium	NE	32	25	18	21	56	57	59	NA	NA	45	NA
Magnesium	NE	23,000	17,000	8,300	7,800	6,300	4,400	1,400	NA	NA	22,000	NA
Manganese	NE	550	430	78	59	68	52	41	NA	NA	660	NA
Molybdenum	NE	<20	<20	11 B	11 B	51	50	52	NA	NA	26	NA
Nickel	NE	<40	<40	4.3 B	3.2 B	55	52	52	NA	NA	48	NA
Phosphorus	NE	<3,000	<3,000	96 B	200 B	220 B	<3,000	<3,000	NA	NA	32,000	NA
Potassium	NE	14,000	13,000	5,400	17,000	74,000	77,000	80,000	NA	NA	24,000	NA
Silver	NE	<10	<10	1.4 B,J	1.1 B,J	1.3 B,J	<10	<10	NA	NA	<10	NA
Sodium	NE	38,000	38,000	17,000	37,000	120,000	120,000	120,000	NA	NA	210,000	NA
Strontium	NE	560	480	340	290	660	620	610	NA	NA	310	NA
Titanium	NE	130	<10	12	22	50	37	34	NA	NA	490	NA
Vanadium	NE	<10	<10	2.8 B	6.5 B	9.1 B	<10	<10	NA	NA	52	NA
Zinc	NE	<20	29	59	7.3 B	42	40	45	NA	NA	400	NA
Cyanide, Total	NE	<10	<10	4.9 B	4.8 B	11	13	NA	NA	NA	<10	<10
Mercury	2	<0.20	<0.20	<0.20	<0.20	0.20	0.20	<0.20	NA	NA	<0.20	NA
METALS, DISSOLVED (ug/L)												
Aluminum	NE	<100	<100	<100	<100	1,900	1,000	1,900	NA	NA	NA	NA
Antimony	6	<10	<10	**6.3 B**	5.6 B	<10	<10	<10	NA	NA	NA	NA
Arsenic	10	**77**	**76**	**12 B**	9.5 B	**19**	**20**	**18**	NA	NA	NA	NA
Barium	2000	230	230	260	230	150	140	150	NA	NA	NA	NA
Beryllium	NE	<5.0	<5.0	0.47 B,J	0.93 B,J	0.23 B,J	<5.0	<5.0	NA	NA	NA	NA
Boron	NE	200	200	160	130	83 B	<100	<100	NA	NA	NA	NA
Calcium	NE	97,000	97,000	75,000	55,000	75,000	75,000	75,000	NA	NA	NA	NA
Cobalt	NE	<10	<10	<10	<10	1.2 B	<10	<10	NA	NA	NA	NA
Copper	1300 (TT)	<10	<10	6.7 B	2.5 B	29	25	28	NA	NA	NA	NA
Iron	NE	5,400	5,500	130	<100	67 B	<100	<100	NA	NA	NA	NA
Lithium	NE	25	26	19	20	55	55	56	NA	NA	NA	NA
Magnesium	NE	18,000	18,000	8,700	7,500	<200	<200	<200	NA	NA	NA	NA
Manganese	NE	420	420	81	26	1.6 B	<10	<10	NA	NA	NA	NA
Molybdenum	NE	<20	<20	9.2 B	9.1 B	48	49	49	NA	NA	NA	NA
Nickel	NE	<40	<40	<40	<40	47	49	47	NA	NA	NA	NA
Phosphorus	NE	<3,000	<3,000	57 B	160 B	42 B	<3000	<3,000	NA	NA	NA	NA
Potassium	NE	13,000	14,000	6,200	19,000	82,000	81,000	83,000	NA	NA	NA	NA
Sodium	NE	39,000	39,000	19,000	39,000	120,000	120,000	120,000	NA	NA	NA	NA
Strontium	NE	500	510	320	250	600	600	610	NA	NA	NA	NA
Vanadium	NE	<10	<10	2.4 B	4.6 B	5.0 B	<10	<10	NA	NA	NA	NA
Zinc	NE	<20	<20	62	15 B	29	30	22	NA	NA	NA	NA
Mercury	2	<0.20	<0.20	<0.20	<0.20	0.20	0.20	0.20	NA	NA	NA	NA

Notes:
USEPA MCL = Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water.
Bold indicates an exceedance of a MCL.
TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.
NE = Not established
NA = Not analyzed
B = Analyte was detected between the instrument detection limit and the reporting limit and is considered an estimated value

FIGURES



PLOT DATE: Jan 16, 2003 2:32pm DISK FILE NAME: (15.06) W:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-01.dwg

N

0 2000'

SOURCE:
USGS CLEARFIELD UTAH
QUADRANGLE 7.5-MINUTE
SERIES TOPOGRAPHIC 1991

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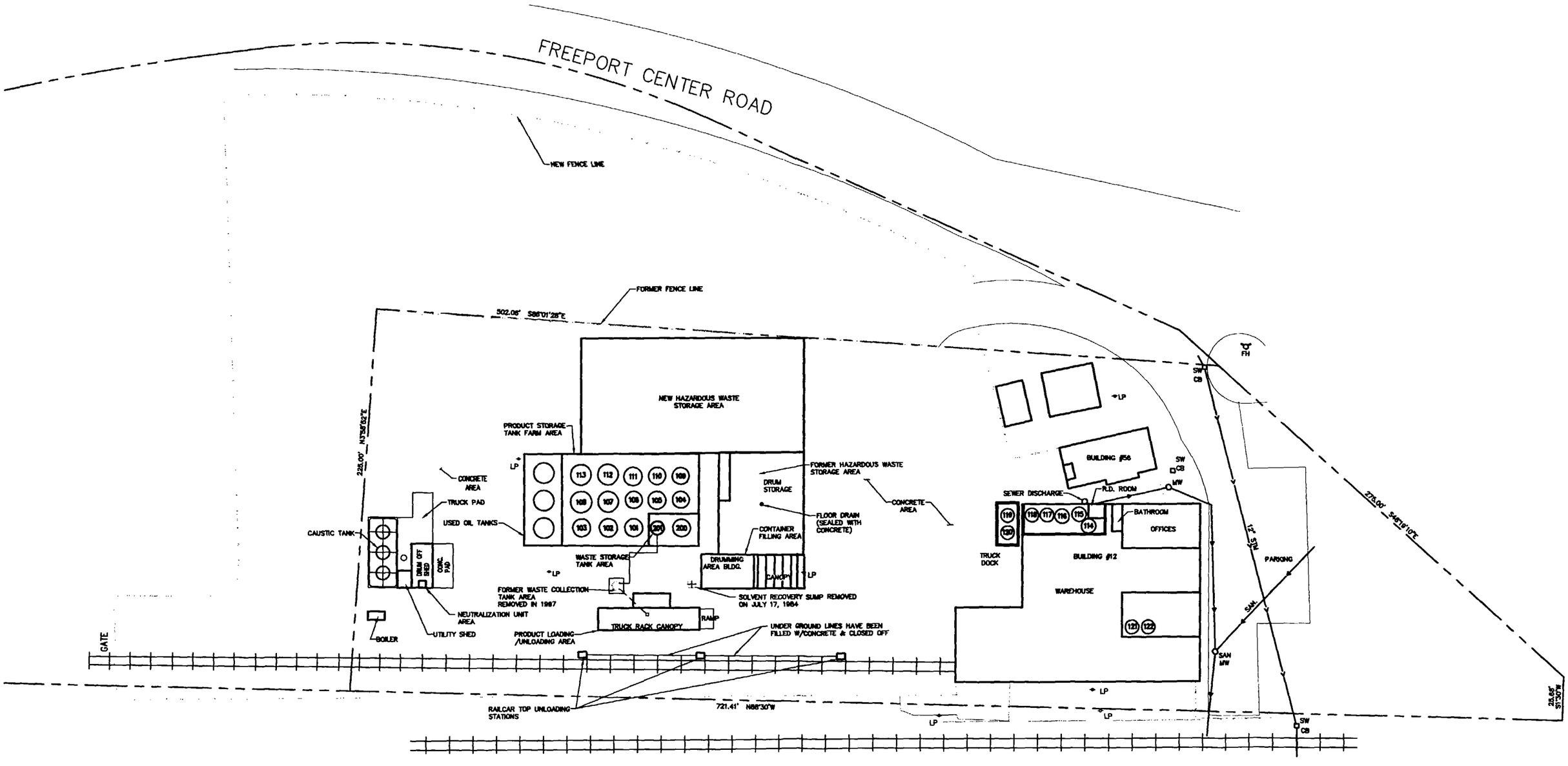
SITE LOCATION MAP
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY:	JAA	DATE: 12/16/02	PROJECT NO.	FIG. NO.
CHK'D BY:	BG	DATE: 12/16/02	52010-125	1



LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER

0 30 60
SCALE IN FEET

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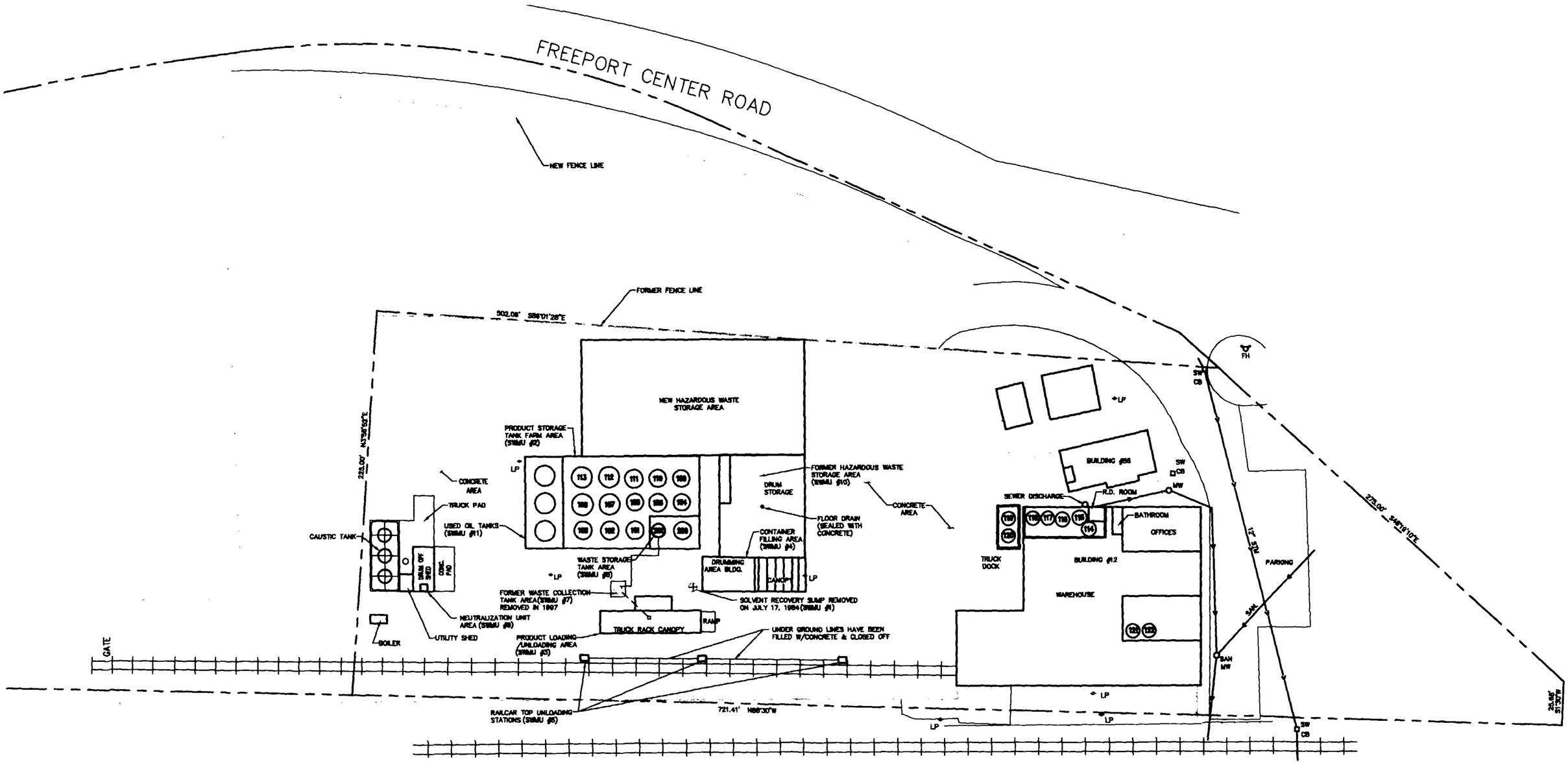
SITE MAP
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY:	JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY:	BG	DATE: 01/07/03	52010-125	2



LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- (#6) SWMU NUMBER

0 30 60
SCALE IN FEET

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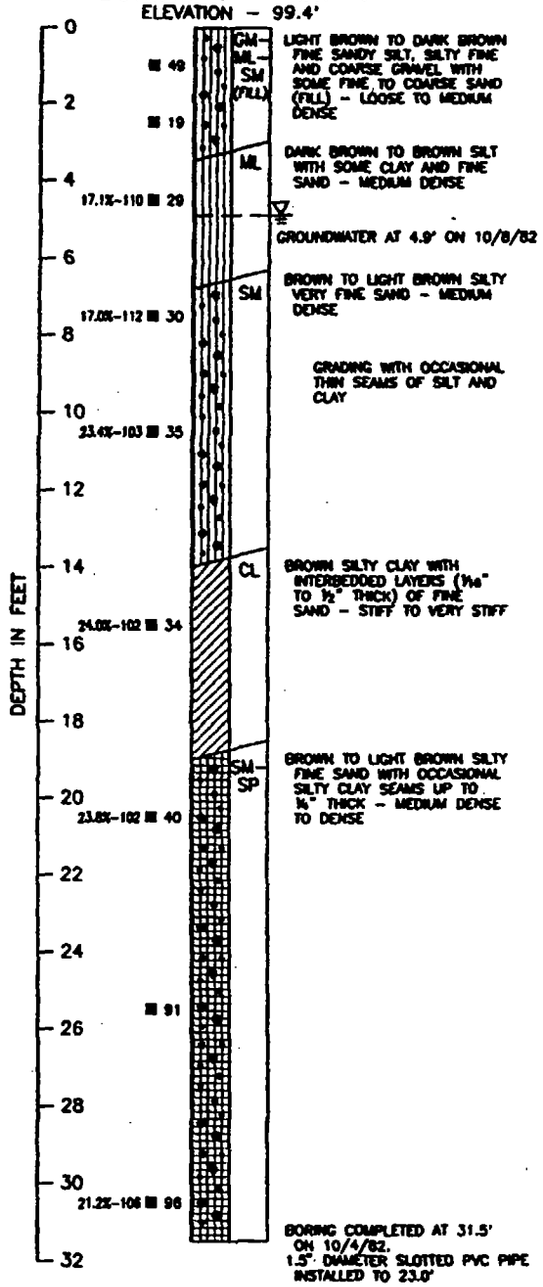
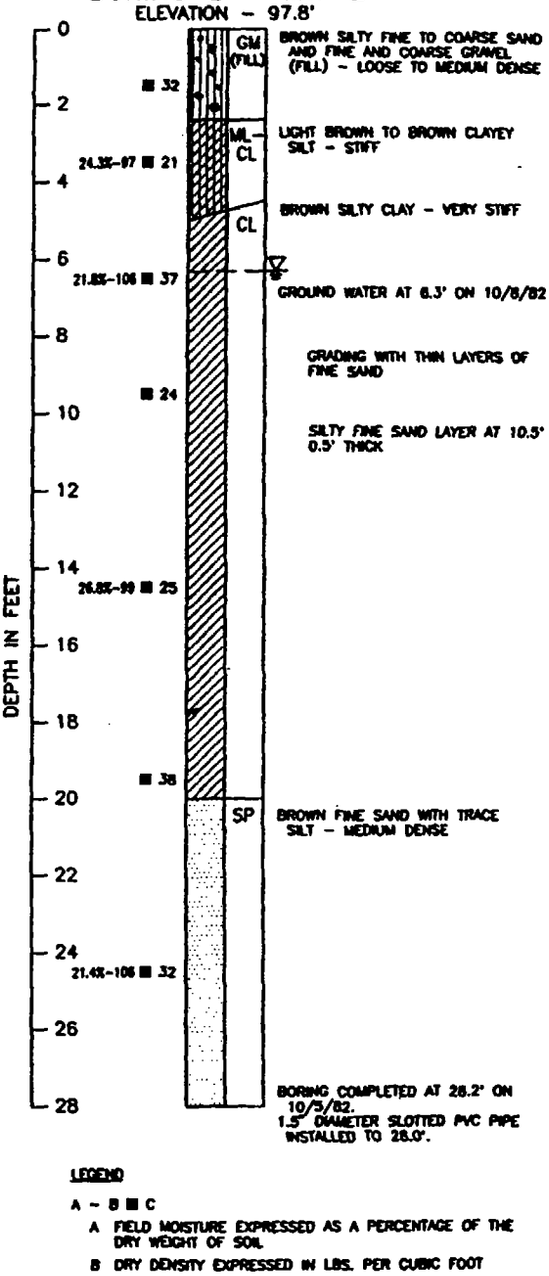
UTAH DEQ IDENTIFIED SWMUs
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY:	JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY:	BG	DATE: 01/07/03	52010-125	3





LEGEND

A – B ■ C

A FIELD MOISTURE EXPRESSED AS A PERCENTAGE OF THE DRY WEIGHT OF SOIL

B DRY DENSITY EXPRESSED IN LBS. PER CUBIC FOOT

C BLOWS PER FOOT OF PENETRATION USING A 140 LB. HAMMER DROPPING 30 INCHES

■ DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED

FROM: DAMES AND MOORE, 1982

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MONITORING WELL BORING LOGS
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY:	JAA	DATE: 12/27/02	PROJECT NO.	FIG. NO.
CHK'D BY:	BG	DATE: 12/27/02	52010–125	4

FREEPORT CENTER ROAD

NEW FENCE LINE

FORMER FENCE LINE

502.06' S86°01'28"E

225.00' N3°58'32"E

NEW HAZARDOUS WASTE STORAGE AREA

PRODUCT STORAGE TANK FARM AREA

CONCRETE AREA

TRUCK PAD

USED OIL TANKS

CAUSTIC TANK

DRUM OFF SHED

CONC. PAD

NEUTRALIZATION UNIT AREA

UTILITY SHED

BOILER

GATE

MW-1

FORMER HAZARDOUS WASTE STORAGE AREA

DRUM STORAGE

FLOOR DRAIN (SEALED WITH CONCRETE)

CONTAINER FILLING AREA

AC-BH009

WASTE STORAGE TANK AREA

DRUMMING AREA BLDG

CANOPY

FORMER WASTE COLLECTION TANK AREA REMOVED IN 1997

SOLVENT RECOVERY SUMP REMOVED ON JULY 17, 1984

TRUCK RACK CANOPY

RAMP

PRODUCT LOADING /UNLOADING AREA

UNDER GROUND LINES HAVE BEEN FILLED W/CONCRETE & CLOSED OFF

RAILCAR TOP UNLOADING STATIONS

721.41' N88°30'W

MW-2

BUILDING #56

SEWER DISCHARGE

R.D. ROOM

BATHROOM

OFFICES

TRUCK DOCK

BUILDING #12

WAREHOUSE

PARKING

12" STM

SAN

SAN MW

SW CB

MW

FH

275.00' S45°29'10"E

25.69' S1°50'W

LP

LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 MONITORING WELL

0 30 60

SCALE IN FEET

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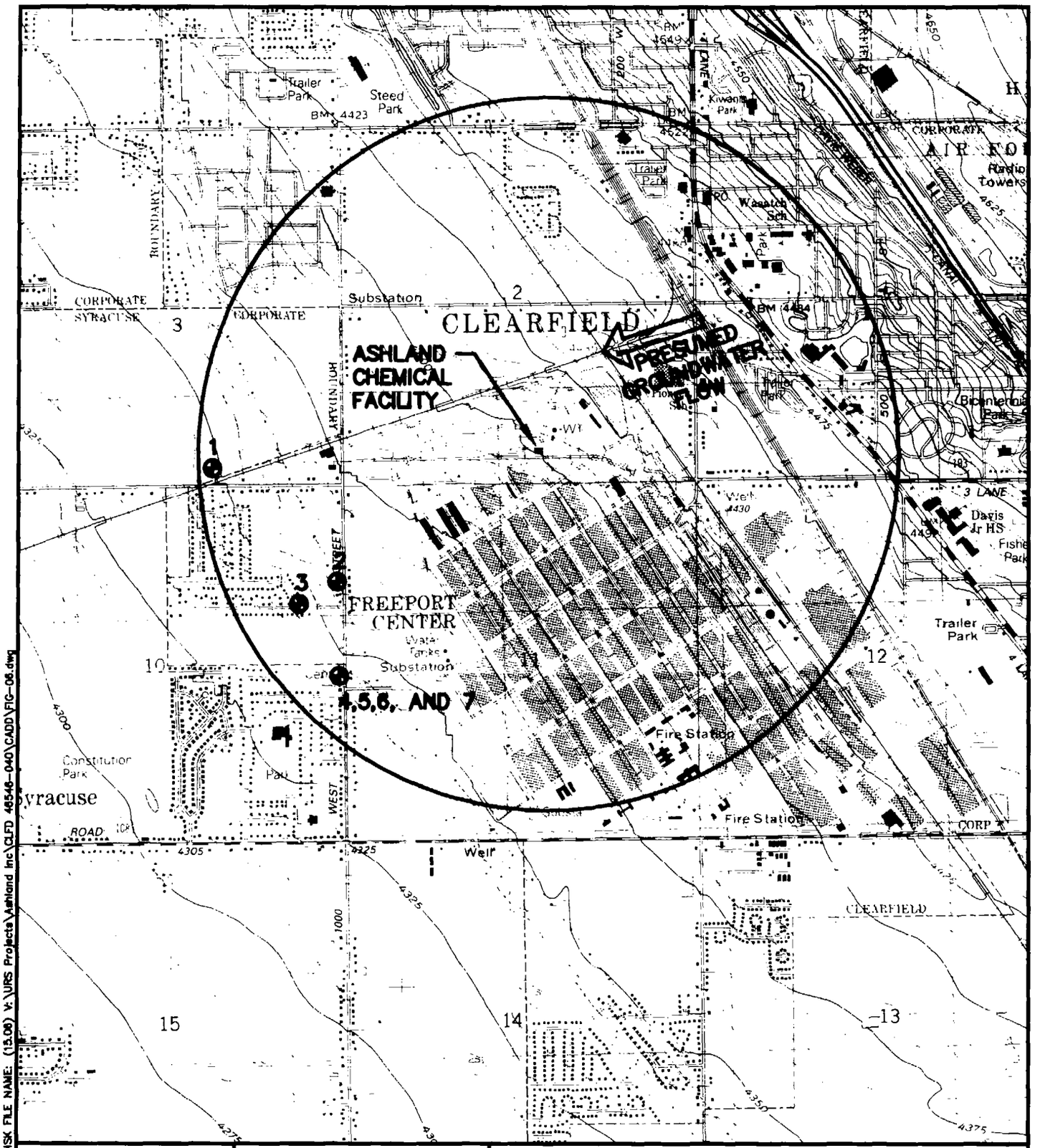
MONITORING WELL LOCATIONS
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY: BG	DATE: 01/07/03	52010-125	5



0 2000'

SOURCE:
USGS CLEARFIELD UTAH
QUADRANGLE 7.5-MINUTE
SERIES TOPOGRAPHIC 1991

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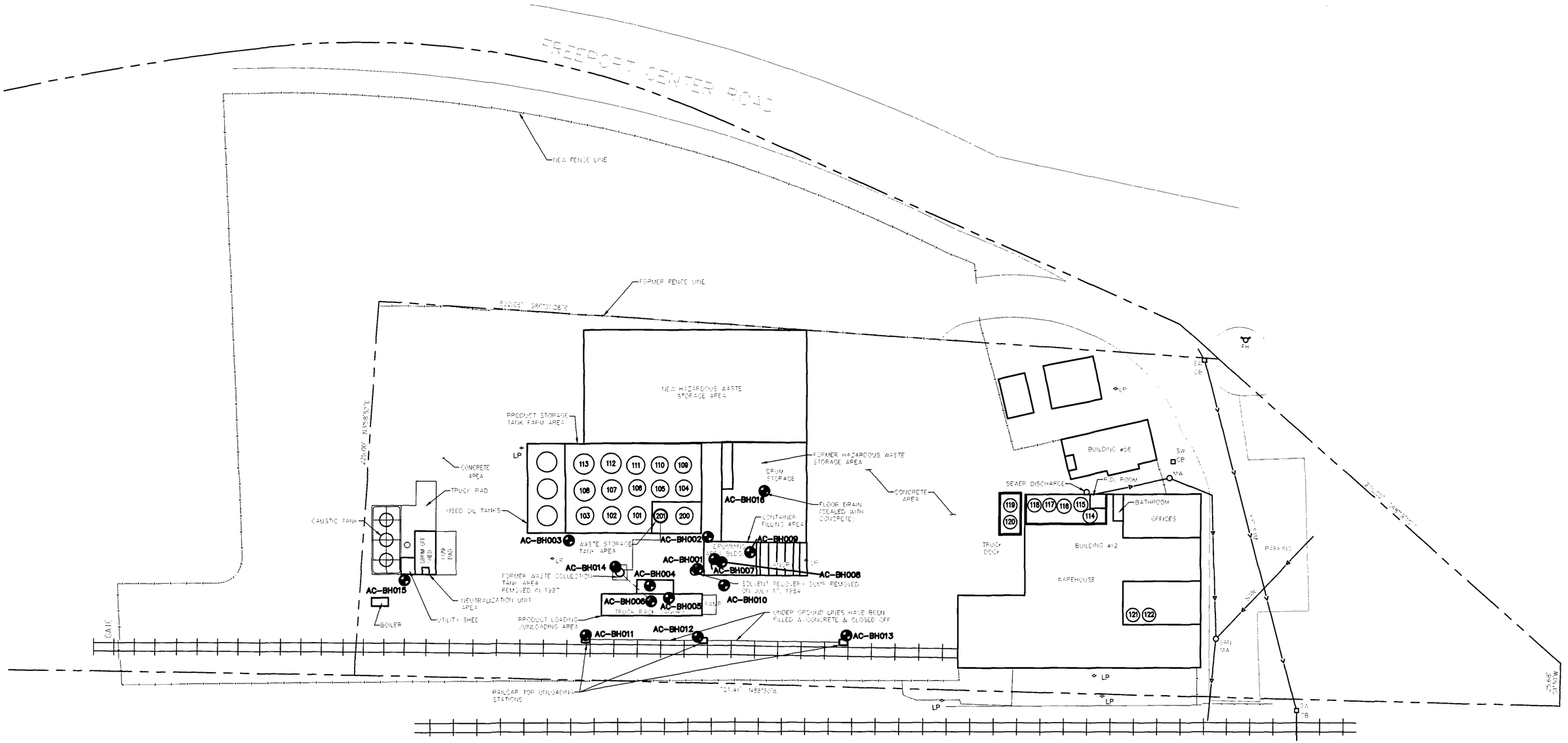
DOWNGRADIENT WELLS WITHIN ONE MILE OF ASHLAND FACILITY ASHLAND INC. CLEARFIELD, UTAH

DRN BY:	JAA	DATE: 12/16/02	PROJECT NO.	FIG. NO.
CHK'D BY:	BG	DATE: 12/16/02	52010-125	6

PLOT DATE: Jan 24, 2003 6:43am DISK FILE NAME: (15.00) V:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-06.dwg



LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- AC-BH011 SOIL BORING

0 30 60
SCALE IN FEET

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Minneapolis, MN 55415
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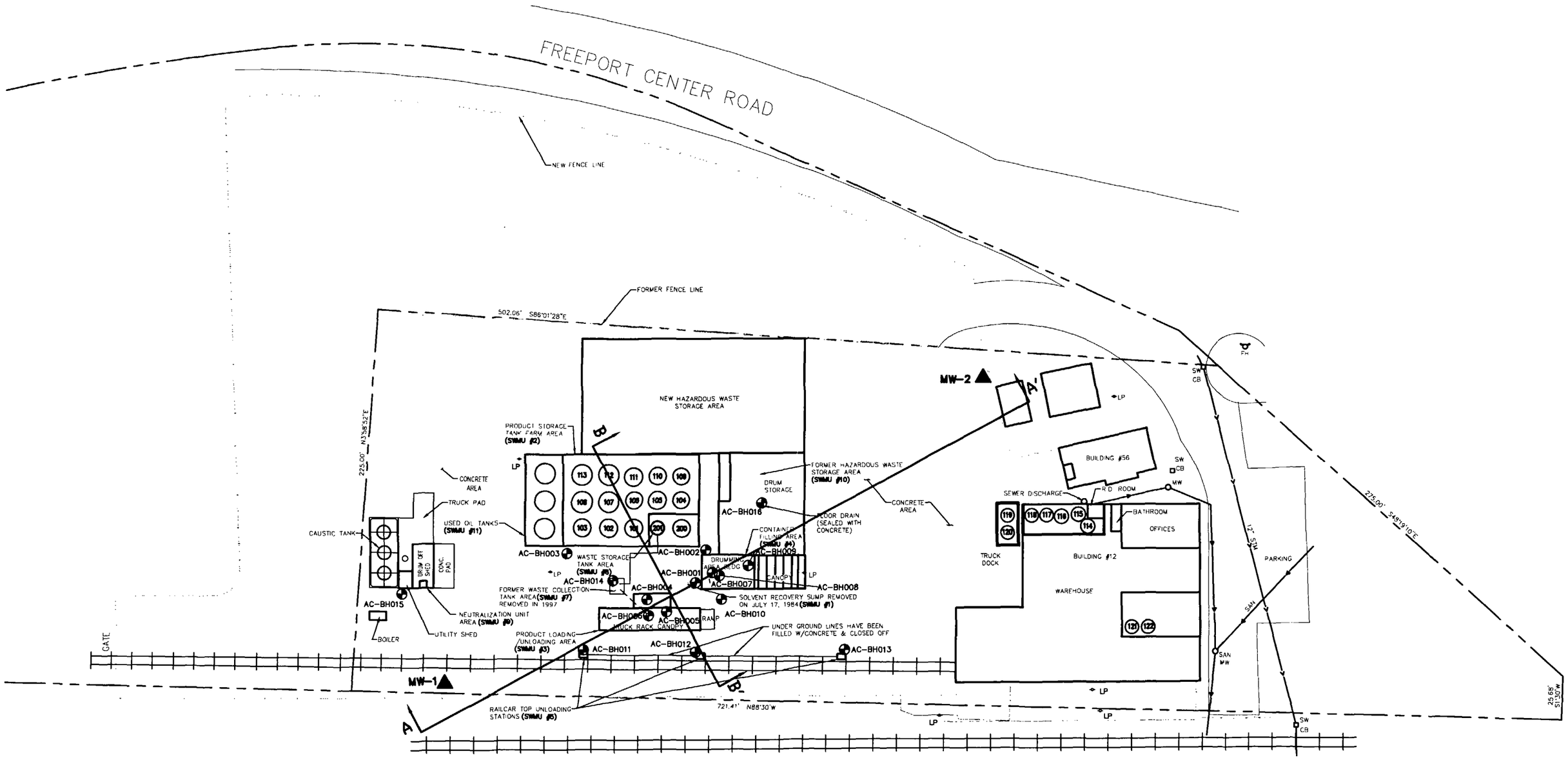
PHASE I RFI BORING LOCATIONS
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO. 52010-125	FIG. NO. 7
CHK'D BY: BG	DATE: 01/07/03		

PLOT DATE: Jan 24, 2003 7:05am DISK FILE NAME: (15.06) v:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-07.dwg



LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 — MONITORING WELL
- AC-BH011 — SOIL BORING
- (#6) — SWMU NUMBER

0 30 60
SCALE IN FEET

URS
Thresher Square
700 Third Street South
Minneapolis, MN 55415
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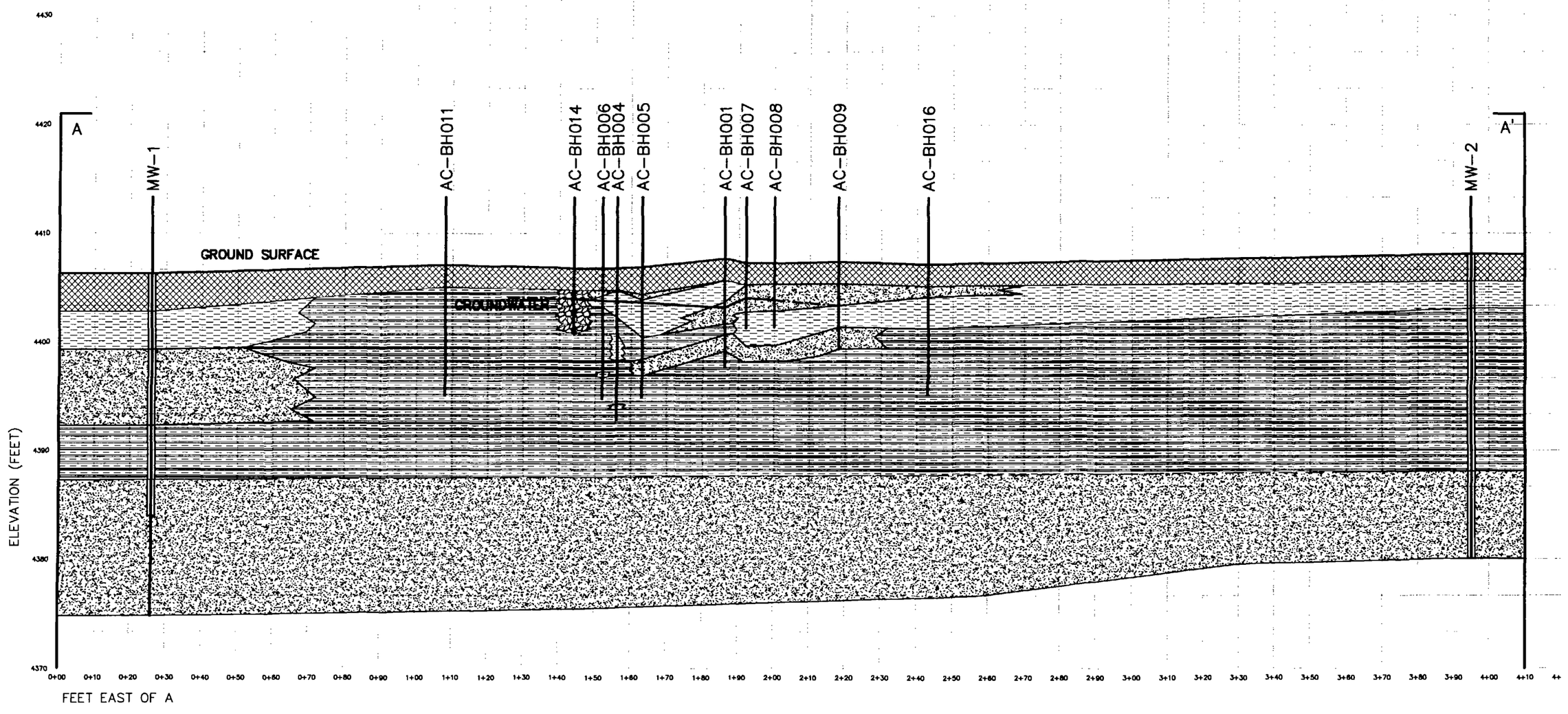
GEOLOGIC CROSS SECTION LOCATION MAP
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY:	JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY:	BG	DATE: 01/07/03	52010-125	8



- FILL/CONCRETE
- SAND
- SILT
- CLAY
- GRAVEL
- MONITORING WELL
- SOIL BORING

1"=30' HORIZONTAL
1"=10' VERTICAL

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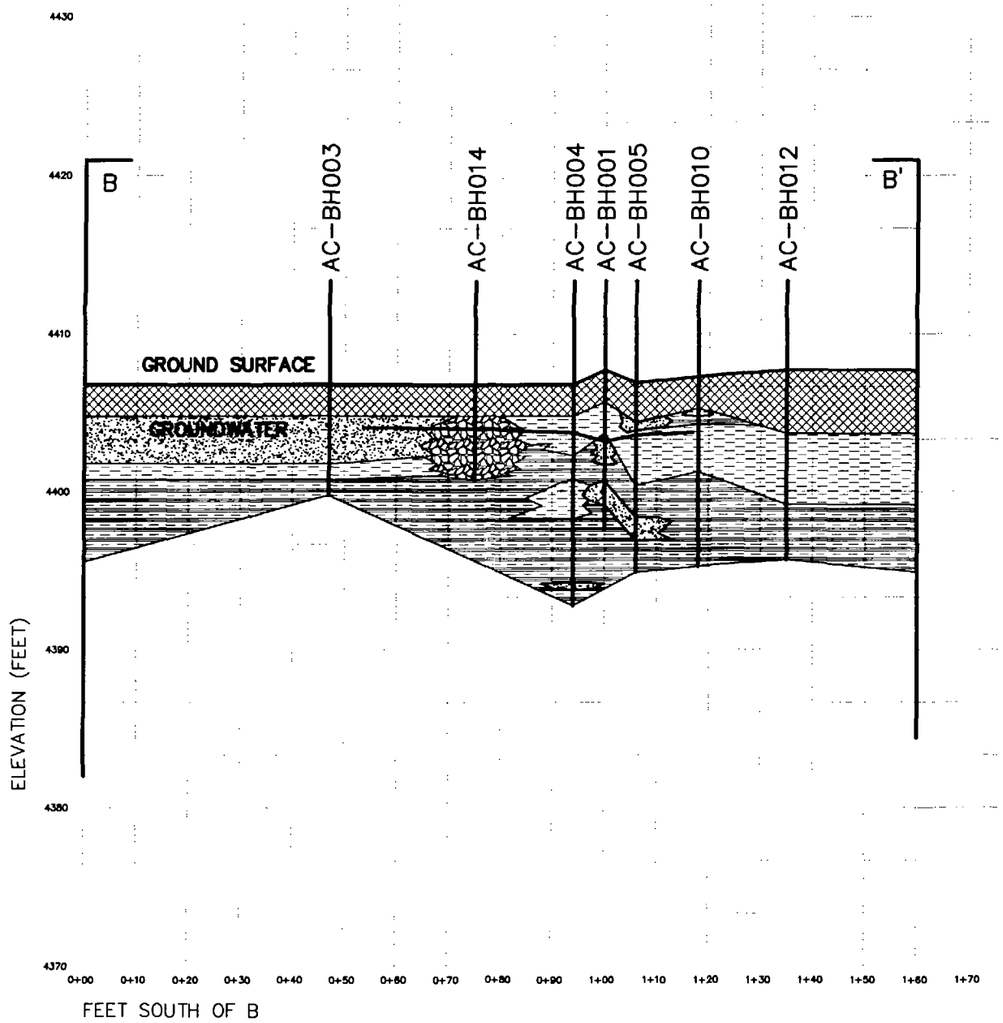
GEOLOGIC CROSS SECTION A-A'
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY: BG	DATE: 01/07/03	52010-125	9



FILL/CONCRETE
SAND
SILT
CLAY
GRAVEL

MONITORING WELL
SOIL BORING

1"=30' HORIZONTAL
1"=10' VERTICAL

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GEOLOGIC CROSS SECTION B-B'
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY: BG	DATE: 01/07/03	52010-125	10

FREEPORT CENTER ROAD

NEW FENCE LINE

FORMER FENCE LINE

GOOD OFF PROPERTY

NEW HAZARDOUS WASTE STORAGE AREA

PRODUCT STORAGE TANK FARM AREA (SWMU #2)

FORMER HAZARDOUS WASTE STORAGE AREA (SWMU #10)

CONCRETE AREA

DRUM STORAGE

FLOOR DRAIN (SEALED WITH CONCRETE)

CONTAINER FILLING AREA (SWMU #4)

SEWER DISCHARGE

P.I.D. ROOM

BATHROOM

OFFICES

BUILDING #5E

BUILDING #1C

WAREHOUSE

TRUCK DOCK

PARKING

CAUSTIC TANK

TRUCK PAD

USED OIL TANK (SWMU #11)

DRUM OFF LOAD SHED

FORK PAD

WASTE STORAGE TANK AREA (SWMU #8)

FORMER WASTE COLLECTION TANK AREA (SWMU #7) REMOVED IN 1987

NEUTRALIZATION UNIT AREA (SWMU #9)

BOILER

UTILITY SHED

SOLVENT RECOVERY TANK REMOVED IN JULY 1984 (SWMU #1)

PUMP

PRODUCT LOADING/UNLOADING AREA (SWMU #3)

UNDER GROUND LINES HAVE BEEN FILLED W/CONCRETE & CLOSED OFF

RAILCAR TOP UNLOADING STATIONS (SWMU #5)

DETAIL NOT SHOWN

GATE

MW-1

MW-2

AC-BH001

AC-BH002

AC-BH003

AC-BH004

AC-BH005

AC-BH006

AC-BH007

AC-BH008

AC-BH009

AC-BH010

AC-BH011

AC-BH012

AC-BH013

AC-BH014

AC-BH015

AC-BH016

Analyte	BH001
VOCs (ug/kg)	4.5'–6'
Acetone	49
cis–1,2 Dichloroethene	7.6
1,2 Dichloroethene (total)	7.6
m– & p–Xylene	3.2

Analyte	BH002
VOCs (ug/kg)	4'–5'
Ethylbenzene	1600
m– & p–Xylene	2000
o–Xylene	320
Xylenes (total)	2300

Analyte	BH007	
VOCs (ug/kg)	3.5'–4.5'	FD–2
Acetone	260	150
m– & p–Xylene	8.2	9.7
o–Xylene	2.9 J	3.7
Xylenes (total)	11	13

Analyte	BH016	BH016
VOCs (ug/kg)	3.5'	8'
Acetone	<1,200	140
Ethylbenzene	1100	100
m– & p–Xylene	3400	24
o–Xylene	830	4.9
Xylenes (total)	4300	29

Analyte	BH009
VOCs (ug/kg)	3'–4'
Acetone	41
m– & p–Xylene	49
o–Xylene	25
Xylenes (total)	74

Analyte	BH008
VOCs (ug/kg)	3.5'–4.5'
Ethylbenzene	7.3
m– & p–Xylene	26
o–Xylene	13
Xylenes (total)	39

Analyte	BH013	BH013
VOCs (ug/kg)	3.5'–4'	12'
Ethanol	580	<30,000
Acetone	84	<1,200
Carbon disulfide	5.8	<300
Tetrachloroethene	5.8	290 J

Analyte	BH003	BH003
VOCs (ug/kg)	2'–4'	6'
Acetone	27	110
Ethylbenzene	<5.4	26
Toluene	1.3 J	19
m– & p–Xylene	<2.7	59
o–Xylene	<2.7	29
Xylenes (total)	<5.4	88

Analyte	BH014
VOCs (ug/kg)	4'–5'
Acetone	160
2–Butanone	37

Analyte	BH004
VOCs (ug/kg)	2.5'–4.5'
Acetone	86
cis–1,2 Dichloroethene	4.6
m– & p–Xylene	6.4
o–Xylene	4.9
Xylenes (total)	11

Analyte	BH011
VOCs (ug/kg)	6'–7'
Acetone	81
m– & p–Xylene	9.7
Xylenes (total)	11

Analyte	BH006
VOCs (ug/kg)	2.5'–3.5'
Acetone	83
Ethylbenzene	11
m– & p–Xylene	23
o–Xylene	9.5
Xylenes (total)	33

Analyte	BH005
VOCs (ug/kg)	5'–6'
Ethylbenzene	880
Tetrachloroethene	300
m– & p–Xylene	900
o–Xylene	210
Xylenes (total)	1100

Analyte	BH010
VOCs (ug/kg)	4'–6'
Ethylbenzene	1100
m– & p–Xylene	1700
o–Xylene	200
Xylenes (total)	1900

Analyte	BH012
VOCs (ug/kg)	6'–7.5'
Acetone	63
Ethylbenzene	7.2
m– & p–Xylene	7
Xylenes (total)	9.1

LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 MONITORING WELL
- AC-BH011 SOIL BORING
- (#6) SWMU NUMBER

0 30 60
SCALE IN FEET

B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result. Result is less than the reportable limit.

URS
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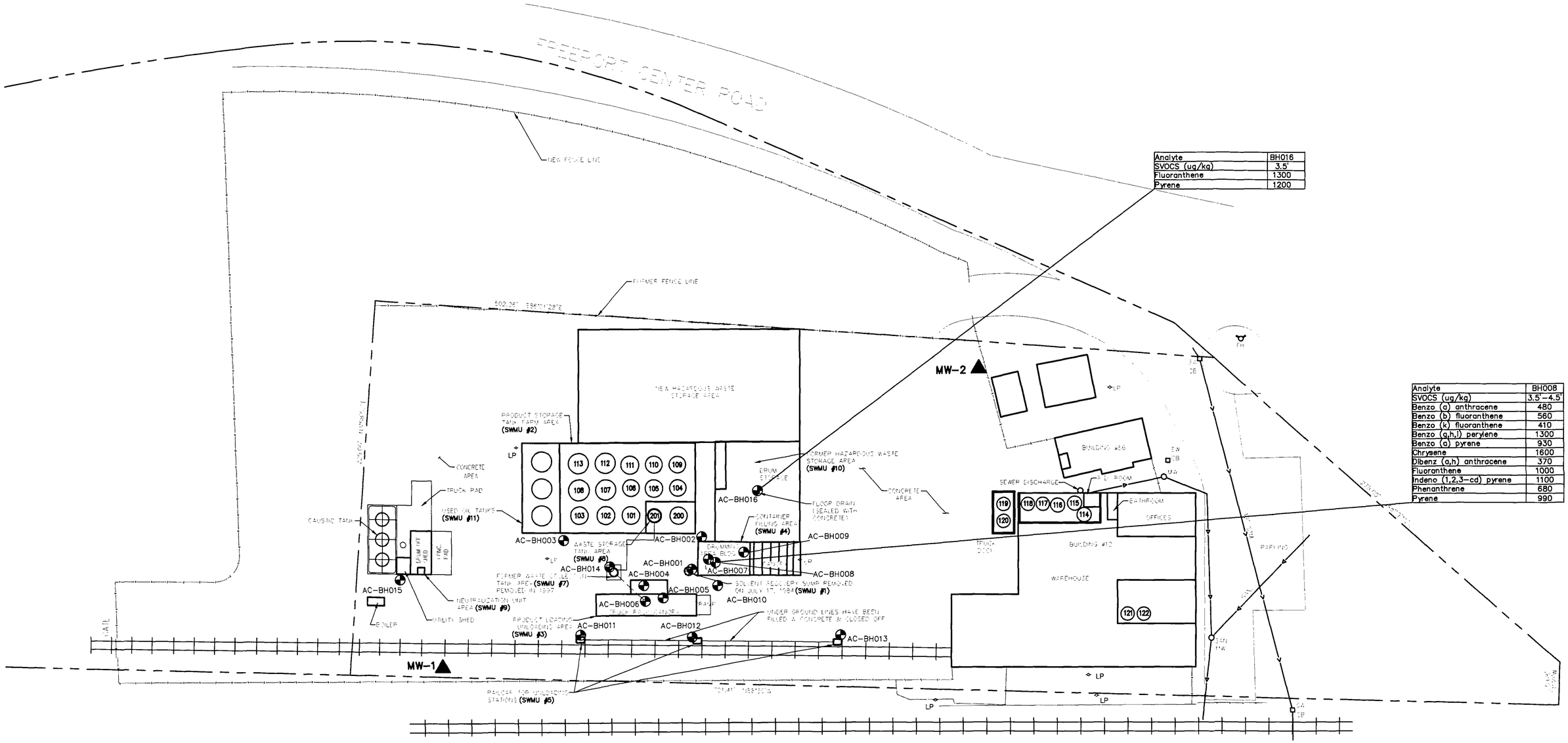
SOIL VOC ANALYTICAL RESULTS (DETECTS ONLY)
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO. 52010–125	FIG. NO. 11
CHK'D BY: BG	DATE: 01/07/03		



Analyte	BH016
SVOCS (ug/kg)	3.5'
Fluoranthene	1300
Pyrene	1200

Analyte	BH008
SVOCS (ug/kg)	3.5'-4.5'
Benzo (a) anthracene	480
Benzo (b) fluoranthene	560
Benzo (k) fluoranthene	410
Benzo (g,h,i) perylene	1300
Benzo (a) pyrene	930
Chrysene	1600
Dibenz (a,h) anthracene	370
Fluoranthene	1000
Indeno (1,2,3-cd) pyrene	1100
Phenanthrene	680
Pyrene	990

LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 — MONITORING WELL
- AC-BH011 — SOIL BORING
- (#6) — SWMU NUMBER

0 30 60
SCALE IN FEET

B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result. Result is less than the reportable limit.

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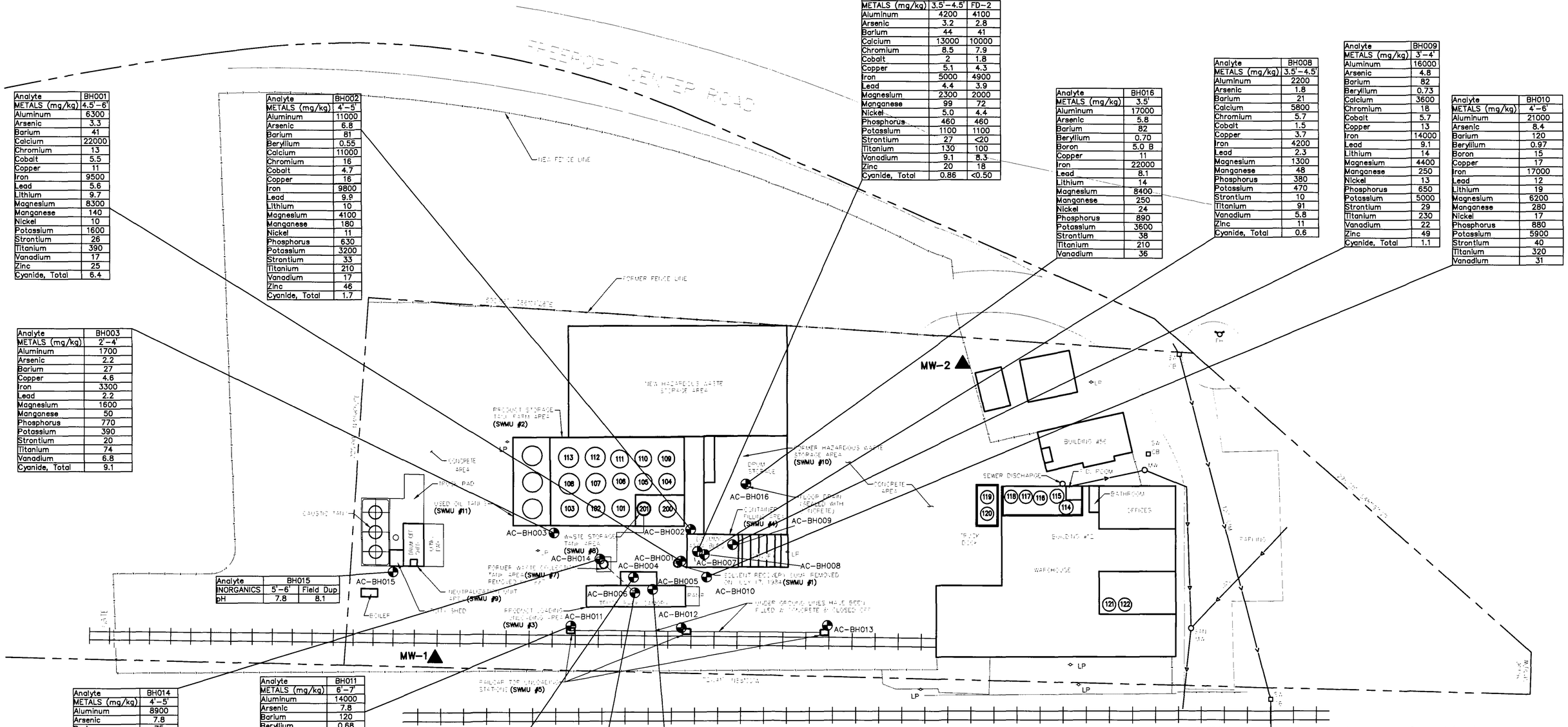
SOIL SVOC ANALYTICAL RESULTS (DETECTS ONLY)
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY: BG	DATE: 01/07/03	52010-125	12

PLOT DATE: Jan 24, 2003 6:39am DISK FILE NAME: (15.06) v:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-12.dwg



Analyte	BH001
METALS (mg/kg)	4.5'–6'
Aluminum	6300
Arsenic	3.3
Barium	41
Calcium	22000
Chromium	13
Cobalt	5.5
Copper	11
Iron	9500
Lead	5.6
Lithium	9.7
Magnesium	8300
Manganese	140
Nickel	10
Potassium	1600
Strontium	26
Titanium	390
Vanadium	17
Zinc	25
Cyanide, Total	6.4

Analyte	BH002
METALS (mg/kg)	4'–5'
Aluminum	11000
Arsenic	6.8
Barium	81
Beryllium	0.55
Calcium	11000
Chromium	16
Cobalt	4.7
Copper	16
Iron	9800
Lead	9.9
Lithium	10
Magnesium	4100
Manganese	180
Nickel	11
Phosphorus	630
Potassium	3200
Strontium	33
Titanium	210
Vanadium	17
Zinc	46
Cyanide, Total	1.7

Analyte	BH003
METALS (mg/kg)	2'–4'
Aluminum	1700
Arsenic	2.2
Barium	27
Copper	4.6
Iron	3300
Lead	2.2
Magnesium	1600
Manganese	50
Phosphorus	770
Potassium	390
Strontium	20
Titanium	74
Vanadium	6.8
Cyanide, Total	9.1

Analyte	BH007	
METALS (mg/kg)	3.5'–4.5'	FD–2
Aluminum	4200	4100
Arsenic	3.2	2.8
Barium	44	41
Calcium	13000	10000
Chromium	8.5	7.9
Cobalt	2	1.8
Copper	5.1	4.3
Iron	5000	4900
Lead	4.4	3.9
Magnesium	2300	2000
Manganese	99	72
Nickel	5.0	4.4
Phosphorus	460	460
Potassium	1100	1100
Strontium	27	<20
Titanium	130	100
Vanadium	9.1	8.3
Zinc	20	18
Cyanide, Total	0.86	<0.50

Analyte	BH016
METALS (mg/kg)	3.5'
Aluminum	17000
Arsenic	5.8
Barium	82
Beryllium	0.70
Boron	5.0 B
Copper	11
Iron	22000
Lead	8.1
Lithium	14
Magnesium	8400
Manganese	250
Nickel	24
Phosphorus	890
Potassium	3600
Strontium	38
Titanium	210
Vanadium	36

Analyte	BH008
METALS (mg/kg)	3.5'–4.5'
Aluminum	2200
Arsenic	1.8
Barium	21
Calcium	5800
Chromium	5.7
Cobalt	1.5
Copper	3.7
Iron	4200
Lead	2.3
Magnesium	1300
Manganese	48
Phosphorus	380
Potassium	470
Strontium	10
Titanium	91
Vanadium	5.8
Zinc	11
Cyanide, Total	0.6

Analyte	BH009
METALS (mg/kg)	3'–4'
Aluminum	16000
Arsenic	4.8
Barium	82
Beryllium	0.73
Calcium	3600
Chromium	18
Cobalt	5.7
Copper	13
Iron	14000
Lead	9.1
Lithium	14
Magnesium	4400
Manganese	250
Nickel	13
Phosphorus	650
Potassium	5000
Strontium	29
Titanium	230
Vanadium	22
Zinc	49
Cyanide, Total	1.1

Analyte	BH010
METALS (mg/kg)	4'–6'
Aluminum	21000
Arsenic	8.4
Barium	120
Beryllium	0.97
Boron	15
Copper	17
Iron	17000
Lead	12
Lithium	19
Magnesium	6200
Manganese	280
Nickel	17
Phosphorus	880
Potassium	5900
Strontium	40
Titanium	320
Vanadium	31

Analyte	BH015	
INORGANICS	5'–6'	Field Dup
pH	7.8	8.1

Analyte	BH014
METALS (mg/kg)	4'–5'
Aluminum	8900
Arsenic	7.8
Barium	75
Iron	8700
Lead	9.6
Lithium	9.3
Magnesium	38000
Manganese	210
Nickel	10
Phosphorus	520
Potassium	2700
Strontium	60
Titanium	150
Vanadium	15
Cyanide, Total	2.2

Analyte	BH011
METALS (mg/kg)	6'–7'
Aluminum	14000
Arsenic	7.8
Barium	120
Beryllium	0.68
Boron	8.9 B
Copper	18
Iron	13000
Lead	22
Lithium	13
Magnesium	4400
Manganese	370
Nickel	12
Phosphorus	830
Potassium	4300
Strontium	36
Titanium	310
Vanadium	22

Analyte	BH004
METALS (mg/kg)	2.5'–4.5'
Aluminum	19000
Arsenic	5.8
Barium	90
Beryllium	0.86
Boron	11
Calcium	4100
Chromium	22
Cobalt	6.4
Copper	14
Iron	16000
Lead	10
Lithium	16
Magnesium	5600
Manganese	580
Nickel	16
Phosphorus	770
Potassium	5100
Strontium	30
Titanium	240
Vanadium	26
Zinc	61
Cyanide, Total	8.1

Analyte	BH006
METALS (mg/kg)	2.5'–3.5'
Aluminum	8000
Arsenic	6.8
Barium	63
Calcium	47000
Chromium	12
Cobalt	3.7
Copper	6.0
Iron	7900
Lead	4.9
Lithium	8.4
Magnesium	6000
Manganese	280
Nickel	8.0
Phosphorus	650
Potassium	1900
Strontium	59
Titanium	97
Vanadium	16
Zinc	24

Analyte	BH005
METALS (mg/kg)	5'–6'
Aluminum	17000
Arsenic	6.5
Barium	96
Calcium	4500
Chromium	19
Cobalt	6.0
Copper	14
Iron	14000
Lead	9.8
Lithium	15
Magnesium	5200
Manganese	250
Nickel	14
Phosphorus	820
Potassium	4600
Strontium	32
Titanium	260
Vanadium	23
Zinc	52
Cyanide, Total	1.1

a = Obtained from USEPA Soil Screening Guidance: Technical Background Document (1996)
b = Obtained from USEPA Superfund Risk Assessment Web Site (http://risk.lsd.ornl.gov/epa/ssl1.htm).

LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 — MONITORING WELL
- AC-BH011 — SOIL BORING
- (#6) — SWMU NUMBER

0 30 60
SCALE IN FEET

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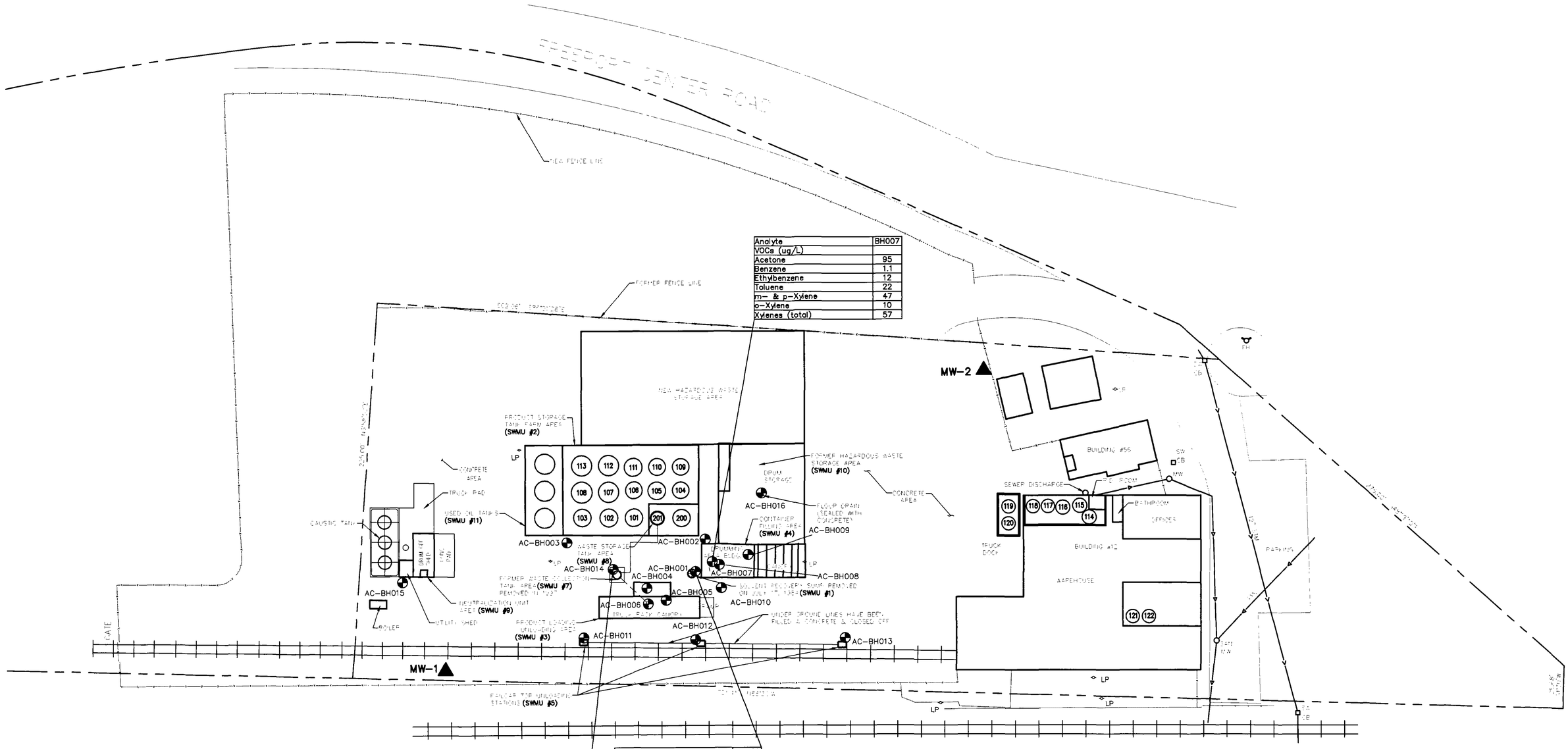
SOIL INORGANIC PARAMETER ANALYTICAL RESULTS (DETECTS ONLY) CLEARFIELD DSO ASHLAND INC. CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO. 52010–125	FIG. NO. 13
CHK'D BY: BG	DATE: 01/07/03		

PLOT DATE: Jan 24, 2003 6:40am DISK FILE NAME: (15.06) V:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-13.dwg



Analyte	BH007
VOCs (ug/L)	
Acetone	95
Benzene	1.1
Ethylbenzene	12
Toluene	22
m- & p-Xylene	47
o-Xylene	10
Xylenes (total)	57

Analyte	BH014
VOCs (ug/L)	
Acetone	100
Ethylbenzene	37
4-Methyl-2-pentanone	26
Tetrachloroethene	6.1
Toluene	120
m- & p-Xylene	170
o-Xylene	73
Xylenes (total)	240

Analyte	BH001
VOCs (ug/L)	
Carbon disulfide	2.4
1,1-Dichloroethane	9.2
cis-1,2 Dichloroethene	23
1,2 Dichloroethene (total)	23
Ethylbenzene	13
Toluene	2.3
m- & p-Xylene	7.1
o-Xylene	4.4
Xylenes (total)	11

B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result. Result is less than the reportable limit.

LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 MONITORING WELL
- AC-BH011 SOIL BORING
- (#6) SWMU NUMBER

0 30 60
SCALE IN FEET

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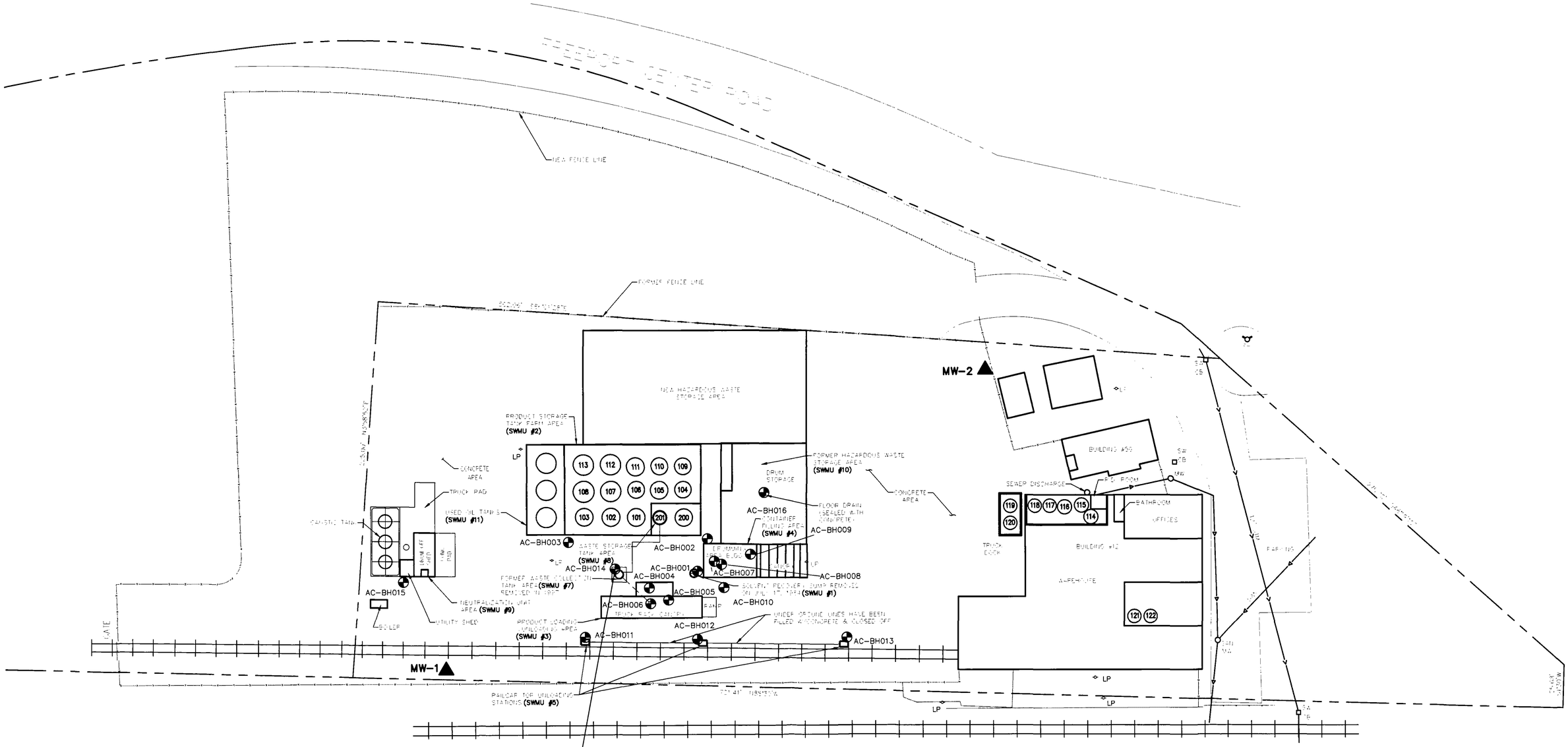
GROUNDWATER VOC ANALYTICAL RESULTS (DETECTS ONLY)
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY: BG	DATE: 01/07/03	52010-125	14

PLOT DATE: Jan 24, 2003 6:40am DISK FILE NAME: (15.06) V:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-14.dwg



Analyte	BH014	BH014	BH014
SVOCS (ug/L)			
Benzoic acid	3600	2700	3400
Phenol	450	320	410

LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 MONITORING WELL
- AC-BH011 SOIL BORING
- (#6) SWMU NUMBER

0 30 60
SCALE IN FEET

B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result. Result is less than the reportable limit.

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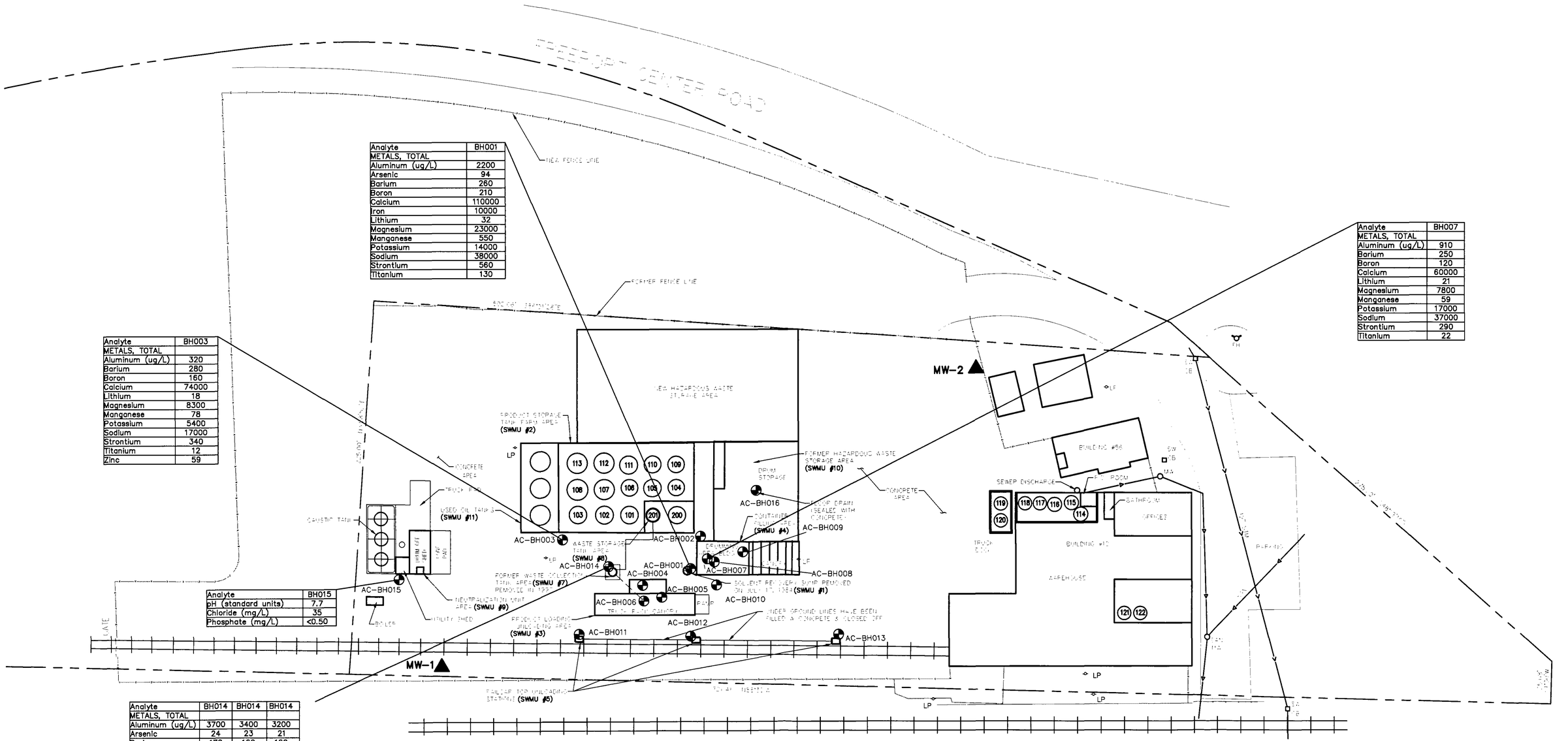
GROUNDWATER SVOC ANALYTICAL RESULTS (DETECTS ONLY)
CLEARFIELD DSO
ASHLAND INC.
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY: BG	DATE: 01/07/03	52010-125	15

PLOT DATE: Jan 24, 2003 6:40am DISK FILE NAME: (15.06) V:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-15.dwg



Analyte	BH001
METALS, TOTAL	
Aluminum (ug/L)	2200
Arsenic	94
Barium	260
Boron	210
Calcium	110000
Iron	10000
Lithium	32
Magnesium	23000
Manganese	550
Potassium	14000
Sodium	38000
Strontium	560
Titanium	130

Analyte	BH007
METALS, TOTAL	
Aluminum (ug/L)	910
Barium	250
Boron	120
Calcium	60000
Lithium	21
Magnesium	7800
Manganese	59
Potassium	17000
Sodium	37000
Strontium	290
Titanium	22

Analyte	BH003
METALS, TOTAL	
Aluminum (ug/L)	320
Barium	280
Boron	160
Calcium	74000
Lithium	18
Magnesium	8300
Manganese	78
Potassium	5400
Sodium	17000
Strontium	340
Titanium	12
Zinc	59

Analyte	BH015
pH (standard units)	7.7
Chloride (mg/L)	35
Phosphate (mg/L)	<0.50

Analyte	BH014	BH014	BH014
METALS, TOTAL			
Aluminum (ug/L)	3700	3400	3200
Arsenic	24	23	21
Barium	170	160	160
Calcium	90000	87000	79000
Copper	36 J	37	35
Iron	2,600 J	1900	1500
Lithium	56	57	59
Magnesium	6300	4400	1400
Manganese	68	52	41
Molybdenum	51	50	52
Nickel	55	52	52
Potassium	74000	77000	80000
Sodium	120000	120000	120000
Strontium	660	620	610
Titanium	50	37	34
Zinc	42	40	45
Cyanide, Total	0.011	0.013	NA
Mercury	0.20	0.20	<0.20

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
B = Estimated result. Result is less than the reportable limit.

LEGEND

- LIGHT POLE
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- STORM SEWER
- SANITARY SEWER
- STORM SEWER
- SANITARY SEWER
- MW-1 MONITORING WELL
- AC-BH011 SOIL BORING
- (#6) SWMU NUMBER

0 30 60
SCALE IN FEET

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GROUNDWATER INORGANIC PARAMETER ANALYTICAL RESULTS (DETECTS ONLY) CLEARFIELD DSO ASHLAND INC. CLEARFIELD, UTAH

DRN BY:	JAA	DATE: 01/07/03	PROJECT NO.	FIG. NO.
CHK'D BY:	BG	DATE: 01/07/03	52010-125	16

PLOT DATE: Jan 24, 2003 6:41am DISK FILE NAME: (15.06) v:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\FIG-16.dwg